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THE SCIENTIFIC MONTHLY

JANUARY, 1916

THE MEN OF THE MID-PACIFIC

By ALFRED GOLDSBOROUGH MAYER

MORE than 2,000 years ago, there lived upon the Islands from Sumatra to the Philippines an ancient sea-faring race, the brown-skinned Sawaiori. Of their origin we know nothing, but that they had long been separated from the Indian Peninsula is evident, for there are no Sanscrit words in the language of their descendants.

Much as the Polynesians are to-day, their ancestors, the half-mythical Sawaiori, probably were in those ages long past, for even to-day no Polynesian population has developed a national solidarity. Their political and social unit is and always has been the village, fortified, self-centered, with no communal interest and no civic virtue extending beyond the limits of its ramparts of rattan.

Weak as a house divided against itself were the Sawaiori when before the dawn of our Christian era, hordes of Malay pirates began to swarm out from southeastern Asia and to overrun the off-lying islands.[1]

We may picture village after village obliterated in an orgie of massacre and outrage. From the roar of burning thatch the weak ones slunk away, while to the cat-like Malay the heroes fell a prey. One desperate resource remained to the persecuted race—flight over the wide and unknown waters of the Pacific.

Eastward went the fugitives in two great streams, one along the northern and the other skirting the southern coast of New Guinea.

But, although forced by hunger to conquer a landing place, there to grow the broad-leaved taro for the onward voyage, no home for the Sawaiori could be found upon New Guinea, for ever in his rear there lurked the Malayan prahu, while the forests around him secreted cannibals hungering for his flesh. Before the dawn of history they sailed, these mariners of a weak and exiled race, who heavy with many a fear the world has long outlived, yet braved the unknown perils of this loneliest of seas—the ocean of the long low heave, the never stilled breathing of the monster in his sleep; for calm over the Pacific has but the semblance

[1] For a résumé of his own and previous researches upon this subject one should consult William Churchill's "Polynesian Wanderings," published by the Carnegie Institution of Washington in 1911.

of peace and over its hours of stillness there broods the threat of storm—to them but the inaction of a demon nursing his rage.

Thus onward sped the disheartened bands until New Guinea and the Bismarck Archipelago faded beneath the western sea, and the high mountains of the Salomons rose majestically above the eastern horizon. Then along the coast of these Islands, so fair to look upon, our wanderers still sailed searching always for the land of peace and finding only the abode of the Melanesian savage, but still beyond, luring them onward toward the rising sun, lay the untried ocean.

Forced at last to leave all land behind, they did as wise sailors would have done, steered close into the southeast trades that blow so constantly over this vast expanse of ocean. Thus when starvation hovered near, when the last of the meagre store of fermented bread fruit had been consumed, and slaves began to fall to sustain the master voyagers, there still remained as a last resource the fair wind to bear them back to the known but dreaded shores of the Salomons.

Such a course from the southeasternmost Salomons close hauled on

NATIVES OF TRUK ATOLL, CAROLINE ISLANDS.

KING AND HIGH CHIEFS OF FIJI, AT BAU, IN 1899.

the tropical wind, would carry our navigators to the Santa Cruz group where once again they had to encounter their old foe the negroid Melanesian. Thus after conquering only enough of the coveted shore to suffice for a temporary resting place, they sped onward and away to discover Rotumah where at last peace from all but their own ambitions awaited them.

Then as years passed and little Rotumah became overpopulated, and jealousies engendered savage wars, some long-forgotten Columbus of the Pacific made a last and final voyage of 600 miles over the open ocean to beautiful Samoa, the El Dorado of the Polynesian race.

With faces toward the rising sun they had gone their fearsome way, and as beaten fugitives taking awful chances a remnant of their race had found the seclusion of a land untrodden by any but their own feet. Yet, as men treasuring the memory of their past, they turned their homesick faces toward the setting sun, whence the spirits of their dead returned over the ocean to the mythical fatherland the old songs still de-

THREE MAIDENS OF FUNAFUTI ATOLL, ELLICE ISLANDS. Types of the Polynesian race.

scribe. For somewhere, far to the westward lay the half-forgotten home, and the something that stands for Europe to us in America, is the fabled Hawaiki to the Polynesians of to-day.

Generations came and passed, but Samoa remained to them by right of eminent domain. Yet history constantly repeats itself, and wars and persecutions again operated as of old, so that within historic times, from five hundred to three hundred years ago, so the old songs tell, great voyages were made from Samoa to Hawaii, to the Cook Islands and thence to New Zealand; to Tahiti, Fiji, Tonga, the Ellice and Gilbert Islands, and to the remotely isolated Easter Island. In Samoa the story is of the departing fugitives and in Hawaii or New Zealand the song tells of their arrival, and the dates of these achievements are fixed by the generations of the chiefs that have been and passed away, and are now but names known but to the chanting priests. For two thousand miles around Samoa the men of Polynesian race were masters of the island-world, and thus from Rotumah to Easter Island four thousand miles from west to east, and from New Zealand to Hawaii

four thousand miles from south to north, one general language is spoken even to our day.

Throughout this vast area, islands uninhabited to-day show crude carvings on the rocks, as at Pitcairn, evidencing the presence of voyagers long dead. There is reason to believe that for centuries before the white man came, the arts of canoe-making and sailing had been declining in Polynesia. Yet centuries

MAN OF TRUK GROUP, CAROLINE ISLANDS. Ear-rings made of turtle and snail shells. Malay admixture is apparent.

MAAFU MAATU, A HIGH CHIEF OF TONGA, nephew of Maafu, who conquered the Lau Group of the Fiji Islands.

before our ancestors dared venture from the sight of land, the Polynesians were lords of the vastest ocean empire of the earth.

Thus far, we have considered only the northern current of adventurers, those who sailed along the northern shore of New Guinea; but as Churchill shows, there were others, who, forced out from the region of Sumatra, wandered eastward along

A WARRIOR OF TARI TARI ISLAND, GILBERT ISLANDS, dressed in cocoanut fiber armor and shark's skin belt, and holding weapons edged with shark's teeth.

the southern shore of New Guinea until they reached the region of Torres Straits, where traces of their language still remain. Then, as they, too, sailed outward over the Pacific, certain of their canoes found a final resting place upon the New Hebrides, as at Efaté, Aniwa and Fotuna, where the negroid Melanesians still retain many Polynesian words and phrases; then, finally, these southern wanderers found Fiji, there to amalgamate with the more primitive Melanesians and to give rise to one of the finest races now inhabiting the Pacific.

As for the remnant of Sawaiori words now found in the speech of the Malays, it is such as one would expect the sons of conquerers to acquire from their mothers of the conquered race.

The purest examples of the Polynesian stock to be seen to-day are in Samoa, the Society, and Ellice Islands. The once superb men of New Zealand, and the giant race of Tahiti have degenerated, the population

of the Marquesas is upon the verge of extinction and the Hawaiians are declining and amalgamating with the Chinese.

In color the Polynesian is a rich bronze-brown, and when not sunburned he may be said to be about twice as dark as a Spaniard or Southern Italian. The black hair, slightly waving, falls in heavy masses over the fine broad shoulders. The somewhat flattened never prominent nose and chin are very characteristic. The lips are full but not protrusive, and the eyes are almond-shaped, giving so close a general resemblance to the Japanese peasant that one has difficulty in distinguishing one from the other when both are mingled in a crowd. The Polynesian is, however, far larger and more muscular in appearance than the Japanese and as he stands superbly erect, his shoulders never bent under the weight of servile burdens or stooped to the student's yolk of mental labor, one is forced to liken him to a bronze statue turned to life, so charming is the symmetry of his superb body. In contrast with the athletes of our own race, his chest-muscles are far finer, and instead of

MOTHER AND DAUGHTER, TARAWA ISLAND, GILBERT ISLANDS.

being good only in arms or legs his uniformity of development is remarkable. None of his muscles stands out in distorted swollen form, but all in all he is the epitome of graceful manly strength, not thin and cat-like as is the treacherous Malay.

In contrast with the Polynesian stands the Papuan of Eastern New Guinea for, despite his Polynesian admixture, in essential characteristics he remains negroid, with a huge mop-like mass of coarse crinkled hair. His skin is dark chocolate, his arms long, his poorly developed legs short and bent at the knees, and his body weakly made, his small eyes bloodshot and sinister, nose large but only moderately flattened, and the weak chin and thick protrusive lips revealing descent from Africa.

WOMAN SHOWING PIERCED EARS, AND MODE OF WEARING MATS. RONGELAB ATOLL, MARSHALL ISLANDS.

YOUTH OF ROGELAB ATOLL, MARSHALL ISLANDS, showing the mode of wearing the mat. Micronesian type.

In Fiji, and to a lesser degree in Tonga we find a mixed race with

the mop-like hair and small cruel eye of the Papuan, but with a splendidly developed body, the proud heritage from Polynesian ancestors. In Tonga and Fiji the average height is probably quite six feet, and the symmetry of form and perfection of development of every muscle in these huge but shapely men seem more statuesque than human to us, accustomed as we are to shoulders bent by the physical and mental tasks of civilization. "A Shrimp" the huge Fijian laughingly designates the white man, in allusion to his puny strength and stooping figure. It is a new thing to us, this sight of superb bronze-brown men and women, all unconscious of their scantiness of clothes, the most beautiful of all nature's children in their naturalness. Nor is it to be assumed that being unclothed is conducive to immorality, for the morals of a Fijian village would put those of our own towns to the blush.

In striking contrast to the finer races of the Pacific is the Australian who is among the lowest of existing men, apparently comparable in culture with the savage who lived in Europe before the Glacial epoch, and whose remains have occasionally been found in caverns as at Neanderthal and Spee. The lowest of the Australians are those of the vast spinifex deserts of the interior, while the highest in physique and culture are found in the tropical forests of Queensland or along the shores of the Northern Territory, where an admixture of Papuan blood has improved the race. But nowhere does the Australian rise to the intellectual level of the natives of the Pacific Islands. His little eyes glitter suspiciously from deeply sunken orbits nearly hidden under unkempt locks of matted hair that conceal the low retreating brow, furrowed and frowning. The dark chocolate color of his face with its huge flat nose, broad-lipped slit-like mouth, projecting teeth, and weak retreating chin form a demon-like picture as he skulks silent and snake-like through the thickets where he seeks the kangaroo. He wears no clothing, but for decoration he may carry a crude necklace of shells or seeds, and his body is seamed by the scars of deep cuts attesting to his clan-brand and manhood in the tribe, and to his duty done in mourning for lost relatives. As one listens to the chattered sounds of these creatures of the wilds and observes them feasting gluttonously upon half-cooked snakes, insects, or lily pads the thought that man is but the descendant of ape-like forms overwhelms one with a horror of conviction as we realize that our own ancestors may once have been such as these.

Only where Papuan influence is apparent does he exhibit any considerable skill in arts, and even here nearly all his implements are designed either for war or the chase. He never cultivates the soil, and lives crouching under the shelter of miserable domelike huts of bark or leaves. The boomerang is his most characteristic weapon, although the spear is actually in more universal use in Australia, and it is doubtful whether even the boomerang was invented in Australia for it is known to the

Malay Houses in the Celebes.

natives of Ceylon and Timor through which the Australians are supposed to have passed on their way from India.

There are rarely more than fifty persons in a tribe, and they live segregated from and suspicious of all others of their race. So restricted is intercourse that in Queensland alone there are more than one hundred distinct languages. Indeed everything about them points to the extreme antiquity of this primitive race whose apparent Indo-Aryan affinities appear to ally them more closely to ourselves than to the Papuans of New Guinea. There is indeed some reason for the conjecture that these hideous people of Australia came originally from Hindustan where their modern cousins are represented in the tribes of the Dravidian coast.

Women occupy a hopelessly degraded position among the Australians, being little more than slaves of their savage captors, who may wound and maltreat them in a shocking manner. Yet in all things the Australian is better where his contact with civilization has been least, for all that is corrupt among us gathers to his ruin and, after a few generations of lingering agony, he vanishes a prey to hideous disease. Far from the coast, hidden in the dense forests of tropical Queensland or in the vast wilds of the Northern Territory there are still superb specimens of this fated race, and even in higher qualities the Australian may not be wanting. One must indeed admire the courage of the lone native of the desert who with a single spear withstood the coming of the explorer Giles and his caravan of camels which must have appeared to him as demons from a supernatural realm.

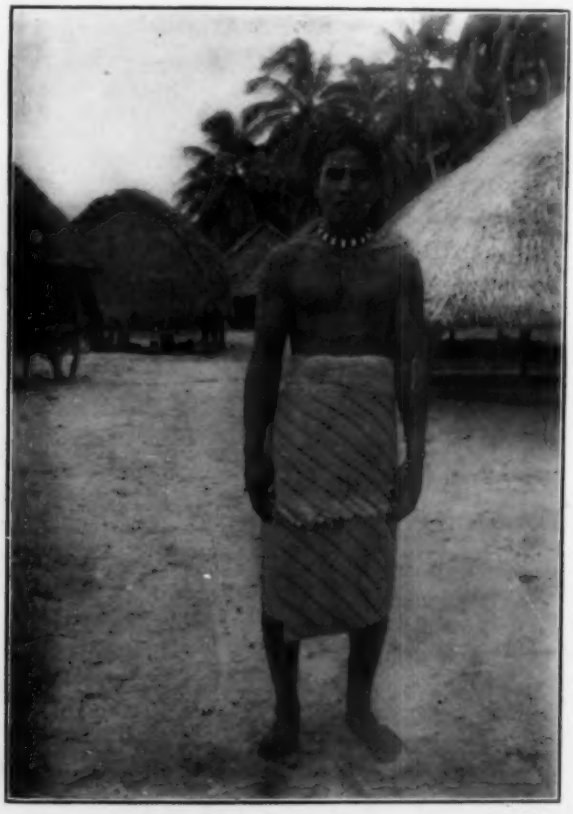
Courage, an attribute of all mankind, they have yet in common with ourselves, and as with all simple people, their deepest fears are but the figments of their own imaginations, thus in Papua and elsewhere where the chiefs have but little power, the sorcerer becomes the dreaded tyrant of the tribe. Here as elsewhere over the Pacific, the whites found the natives shuddering under the espionage of a host of evil spirits of their myths, and even to-day when Christianity has in great measure supplanted old beliefs, it is the sermon narrating the horrors of hell that commands their entranced attention. A deity of love is still to them but an unnatural abstraction and a vengeful, jealous demon, delighting in his opportunity to punish, is still the favorite god of the natives of the Pacific.

Yet primitive though the Australians are in most respects and unresponsive to the influences of higher cultures as they have always remained, the researches of Baldwin-Spencer in the Northern Territory show that the natives have been systematically under-rated by previous observers, for in their complex and picturesque ceremonial of propitiation to gods, ghosts and ancestral spirits, as well as in their rigorous etiquette and respect for fundamental rights within the tribe, they chal-

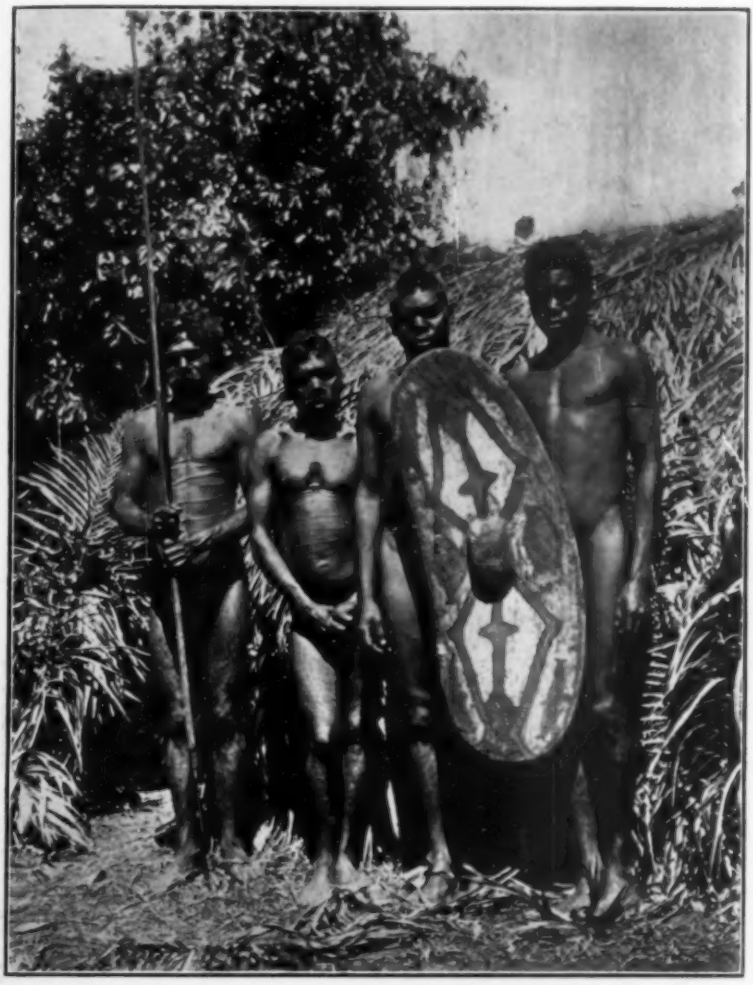
lenge high admiration. A ceremonial deep-rooted in tradition and fixed by unchangeable custom controls nearly every act, and tinctures every thought of their lives. Even in the minds of the young men this ceremonial occupies an important place, but as years go on a greater and greater proportion of time is devoted to its observance, so that religious rites and dances become practically the sole occupation of the aged.

The skill of the Australians in tracing barely discernible trails through the forest is extraordinary, for they follow at a run the track of a horse which passed over the ground five days previously. Their young children learn to read with greater rapidity than do those of the whites but advancement soon ceases, and arithmetic is a stumbling block which they rarely or never overcome. Indeed, in the wilds they are commonly unable to count beyond three or four without objective aid.

So small are the tribes, and so transient their settlements, that there is little communal organization for defense, and thus it is that in Australia the chiefs are held in but little respect, whereas among the Poly-



MAN OF TARI TARI ISLAND, GILBERT ISLANDS. A type of the Micronesian.



NATIVES OF KURANDA, QUEENSLAND, AUSTRALIA, standing in front of their house. The self-inflicted scars denote mourning for dead friends and relatives.

nesians where the village is a store-house of valued property whose owners must be both defended and aggressive, the chief gains so high an importance among conditions incident to a state of feudalism, that he becomes a semi god-like personage across whose shadow none dare pass, and who must be addressed in language more primitive and ceremonious than that used in conversing with ordinary men. A great body of tradition transmitted verbally from generation to generation has grown up in Polynesia, and the ancestry of the chiefs of the Malietoa family of Samoa is traced thus for twenty-five generations, and stories of voyages from Samoa, the Cook Islands, and Tahiti appear in the songs and myths

THE PRECIPICE NEAR KATOOMBA IN THE BLUE MOUNTAINS OF NEW SOUTH WALES.

of New Zealand and Hawaii. The question "What canoe did your ancestor come over in" is an important one in Polynesia as well as in Massachusetts. Yet in Polynesia, as with ourselves, the treasured traditions are those telling of the achievements of ancestors and the great deeds of aliens are soon forgotten. Thus, when Cook reached New Zealand in 1769 he was surprised to find that the natives retained no traditions respecting Tasman's visit to their shores in 1642.

As La Farge says it is remarkable that the development of art among

the peoples of the Pacific is by no means commensurate with the standard of their general culture. It is true that the Australians, who are probably the lowest, display no considerable skill in their arts, but the Papuans excel the more cultured peoples of Samoa and Tahiti. In the Pacific, as with all savages, art constantly manifests a symbolic and religious tendency. In Eastern New Guinea and the Trobriand Islands, the theme of the decoration is the representation of the head of the worshipped frigate bird, while in the Cook Islands the elaborately carved paddles were covered with the conventionalized figures of tribal heroes. Almost if not every design, could we discover its history, would be found to be a picture-prayer to a demon, ghost, or ancestral spirit of the tribe. Art's chief concern is to placate spirits powerful for good or evil. Yet human nature in far Polynesia is not different from its co-type in Paris, and in every savage tribe those who love form and color, love it for its own sake and, like Whistler, feel that art *is* and needs no mission to justify its being.

It is always the spirit of the man who has been murdered that the South Sea Islander dreads, and should a tree fall, all within hearing flee to avoid the sight of the disemboweled ghost of the victim of some half forgotten feast. The very breeze among the palm trees whispers tales of a horrible past.

Everywhere over the Pacific Islands, be the inhabitants of what race they may, there are certain fundamental things in which they are alike. The house is but a single room, and among the cruder tribes it serves not only as a shelter for the family, but also for the housing of pigs and chickens. Property in Polynesia is possessed by the family or the community rather than by the individual, and under certain conditions if a member of the tribe steals from his neighbor and succeeds in secreting his possession for several days he acquires a personal right to that which he covets, and may then appear acknowledged by all as its owner by right of strategy. The system of barter is usually direct without the intervention of any sort of currency, and presents in our sense are unknown in the Pacific. Your intended gift will be received as proffered barter, and returned at once if it be undesired. Thus it is that white-handled knives could not be disposed of even as "gifts" in Fiji, while black were readily accepted, and conspicuously patterned red and white waist-clothes must be presented in Tahiti, but dark blue ones are in vogue in Fiji.

Everywhere one finds traces of the customs of cannibal days revealed at times in acts the significance of which is now unthought of. Thus in Samoa the village reprobate is wrapped in leaves and carried through the town, and then placed upon the cold stones of an oven, the fire in these days remaining unlighted. In Fiji, the deepest insult is to refer to a man as the "son of a roasted father."

Among uncultured peoples the rulers aided by the priests soon invent

EUCALYPTIS TREES AND SANDSTONE PRECIPICES NEAR WENTWORTH FALLS IN THE BLUE MOUNTAINS OF NEW SOUTH WALES.

means to relegate to themselves privileges which once were shared among the many, and matters thus restricted to the few finally become shielded from the masses by religious screens which take the form of tabus. Thus over the Pacific, cannibalism which once simply satisfied the appetite, of the starving, became religious in its significance and restricted to the aristocracy, among whom it was supposed to transmit to the victor the virtues of the vanquished; to this end being practised by the North American Indian as well as by the Pacific Islander.

Man must measure all things in terms of his own experience, and to the Pacific Islander we ourselves are imagined to live in small communities upon distant islands. We are supposed to know personally all other white men and many an unfortunate mariner has been held responsible for the evil acts of those of other ships—his friends and tribesmen from the native's point of view. Thus it was that, in 1839, Williams the great missionary was murdered in the New Hebrides in revenge for outrages committed upon the natives by previous visitors, and the philanthropic Commodore Goodenough met death at Santa Cruz from a similar cause in 1875.

All sorts of miracles are expected from the white man, and it is only rarely that a native evinces any surprise at our acts. The working of great steam engines, the phonograph, photography and the electric light are taken as matters of course even though seen for the first time. I have, however, seen a Polynesian chief too greatly alarmed to wait for his beverage when upon pressing a button an electric bell jingled in the adjacent room; another leaped overboard in a paroxysm of fear when given a cake of ice, while in another instance the uncanny event of the visit was the glowing of an electric light immersed beneath the sea. Wilkes found that the Fijians were far more afraid of his rockets ("fiery spirits") than of his guns or cannon. Miracles to be received as such must fall within the field of our partial comprehension, the wholly inexplicable is neither miraculous nor interesting. A Fijian

LOOKING DOWN THE VALLEY FROM GOVETT'S LEAP IN THE BLUE MOUNTAINS OF NEW SOUTH WALES.

A Tree Fern in the Primeval Woods of Queensland.

taken to Sydney gazed stolidly upon the great buildings with no expression of surprise, but was deeply stirred upon seeing a two-wheeled push-cart laden heavily with bananas.

A custom which is probably of Polynesian origin, but has spread universally over the Pacific, is that of the tabu which was a consequence of the communistic ownership of property. The ceremony of the tabu is pronounced by the high chief, and thereafter none may molest the protected place or thing. Thus the cocoa-nut palms are made tabu while the fruit is maturing. There are, however, many forms of personal tabu which merge into witch-charms and threats of evil, for belief in witches is universal over the Pacific.

In the South Sea Islands women are considered to be the property of men and the ceremony of marriage where it exists shows its kinship with that of the tabu. Struggles for the possession of women are almost the sole cause of native warfare, and everywhere woman is the servant rather than the companion of man, although in some places her domestic

duties may be the reverse of our conception, as in Truk in the Carolines where the woman goes out upon the sea to fish, while the husband remains at home to care for house and children. The "house" is however only a combination of chicken-roost and pig pen. It is due to the looseness of the marriage tie and not to respect for women that name and rank descend through the maternal side, the mother alone being ascertainable with certainty.

A pleasing element in the life of the Polynesians is their system of entertaining strangers. The largest edifice in the village is set aside for this purpose and is called the "strangers' house," and upon the coming of guests it resounds far into the night with the sound of song and dance. When the copra is to be gathered, or the taro matures in the swamps, or the yams have grown big upon the mountain sides then one hears the songs of many a canoe bearing youthful visitors gaily decked in garlands, and singing to the rhythmic splash of paddles as they glide along the

NATIVES OF PONAPI, CAROLINE ISLANDS.

HOUSE AT EUA ISLAND, TONGA.

shore. The entertaining village is then full of merriment until the labor of the harvest is over when the chief apportions all among the families of his village and their guests. For socialism is the dominant spirit of life in Polynesia.

The chief holds property only in the name of his tribe, the individual hardly exists as a personal owner of earthly things, and intelligent natives have declaimed to me against "the money of the white man" saying that "it was the cause of all our selfishness." When I spoke of our paupers to a head chief of Fiji he asked in surprise how could this be for "surely their friends would feed them were they hungry." In Fiji years ago, so the story goes, an ambitious young native became a clerk to a grocer in Suva, and so good a salesman was he that his English master sent him back to his native village with a goodly supply of grocer's stores. Whereat old friends and neighbors came to partake of these things but were told that all were to be sold as did "the white man in Suva." In a storm of rage the contents of the budding grocer's shop were divided among all in the village, and the "meanest man in Fiji" returned to "the white man's town."

In Polynesia an era of dark portent dates from the white man's coming, for long ago they were content in the thought that the village had always been there since the sea-god Hiro had piloted their ancestral canoe to the Island from that other Island of Hawaiki far to the westward in the region of Pulotu where the dead go home in the evening. Through all the ages since those long gone days the thatched houses

had clustered under the shadows of the cocoa palms, and rustling leaves and murmuring surf had lulled the village in its sleep. As it always had been so it was, and so men felt it would endure as did the long blue line whereon the ocean met the sky. Unchanged it always would be so the old dreamer Maui sang until a canoe would come that would float upright without an outrigger; an impossibility as all men knew.

But one day it came, that God's canoe without an outrigger. Cloud-like it shaped itself and grew ever more ominous and vast until its huge sails towered above the palm trees, and it came to rest. It was the canoe of the Papalangi, they "who came from beyond the sky." Then pale-faced ghosts—"the sailing gods"—came upon the island, and the new era commenced for the little village.

A long sad era that endures to-day, darkened by the horrors of strange disease and death, humiliated by the domination of avaricious and unsympathetic masters who peonized the bodies and despised the traditions of the people of the little village so that to-day it lingers silent and withering, where once its songs of merriment were heard.

May we from our cultural heights descend to cheer with kindly sympathy these children of the Island World? Is there aught in our civilization that can serve to instil into their minds new hope, to reestablish industry, and renew ambition? The task is difficult indeed, for the weak have always been the victims of the strong, be they civilized or savage.

The very possession of skill in arts and trades has penalized the

CANOE AT VAVAU, TONGA.

natives and subjected them to the persecution of the bigoted and the avaricious.

Fair play is sadly needed—indeed the thing most needed—in the Pacific of to-day. Only through governmental action can adequate craft-schools be maintained and markets found and developed for the products of native manufacture.

It is a sad reflection upon our civilization that, through wanton neglect, the world has lost the art of the famous wood carvers of New Zealand, the mat and fan makers of the Marshall Islands, and the tapa decorators of Hawaii, Samoa, and Fiji. Yet under sympathetic guidance these crafts might have been modified to conform to the demands of world wide markets and the carved furniture of New Zealand, the artistic floor matting of the Marshall Islanders, and the attractive wall papers of the Hawaiians might have been the prized possession of many an American and European home.

Grant them but a just profit for their labor and the races that now are dying of apathy would suddenly awaken into ambitious, self-respecting men and women.

GOVERNMENTAL OBSTACLES TO INSURANCE[1]

By Chancellor DAVID STARR JORDAN
STANFORD UNIVERSITY

I HAVE been asked to speak on the topic of governmental obstacles to insurance, not that I have any special knowledge of the topic, but because these "obstacles" form part of a system of discipline with which I have had some experience and in which we may find something of interest. The obstacles in question are those of compulsory state insurance, a paternal arrangement which safeguards the worker without any will or initiative of his own or even against his purposes. The insurance premiums are not a gift, but a forced withdrawal of some portion of the workman's earnings, and the need to preserve his claim to these savings serves as a safeguard to prevent him from wantonly leaving his job. Naturally this system, with the accompanying system of old-age pensions, tends to cut the nerve of personal care for the future by throwing the responsibility on the state. Naturally, also, it interferes with the normal working of insurance arrangements, for these appeal to individual initiative and forethought. These thrive best in an atmosphere of freedom, while the systems of state insurance and old-age pensions deal with men and women mainly as cogs in the wheels of a great industrial machine.

We all recognize in theory, at least, the value of some sort of discipline. This involves an orderly use of one's powers and a willingness to subordinate our whims or our interests to some general system related to the common welfare. Discipline implies obedience, and the different types of obedience indicate the nature of this discipline. We may recognize three classes of discipline of grown men. These we may differentiate as democratic, social and paternal. Under the democratic discipline each man is responsible to himself for his own guidance. The period of preliminary education past, he chooses his profession, his own ideals, his own place in the world. Democracy means opportunity, nothing more. It opens the whole world before each man, and so much of it is his as he has the wisdom, the strength and the patience to take. This life is not successful unless he has the wit, the soberness, the virtue to make it so. If he has the chance to rise, he has also the chance to fall. He is not held in his place by dull averages. If he is able to develop no ideal, if he wastes his strength in dissipation or vice, if he is one of the unfit in the struggle for life, he must in some degree take

[1] Substance of an address before the World Insurance Congress, Panama-Pacific Exposition, San Francisco, October 8, 1915.

the consequences. Under a democracy, the government is simply the cooperation of the people for mutual aid, to achieve those needful results which are beyond the reach of private effort. Its main duty is summed up under the head of justice. And under this head come sanitation, education, the conservation of resources, the making of roads and public buildings and the maintenance in national and international relations of law and order, those conditions which permit of progress, of normal effort and happiness, which we call by the general name of peace.

What I call social discipline arises through obedience to ideals formed in cooperation. One's inspiration arises not primarily from within, but from the thoughts and needs of his neighbors. At its best, the social discipline is an outgrowth of the democratic discipline. It is through its agency that the great cooperative efforts of our race are achieved. To work for the nation is not the same thing as "to hold down a government job." The vulgar attitude towards public affairs is found in all nations—the most pronounced in those least advanced and least democratic. But a sense of social service is one of the best incentives to personal efficiency. It is this sense which has vivified the fight against yellow fever, the bubonic plague and the multitude of minute organic pests which we know by their effects as infectious disease. It is the impulse of social service which has built the Panama Canal, which is restraining the floods of China, which is healing Serbia and feeding Belgium, which in every nation in its degree is fighting against the War System, its theory and its results.

The social discipline must rest on some system of voluntary cooperation. It can not be enforced from without. Its purpose can not be accepted as a substitute for achievement. In any form of enforced cooperation, the fine spirit of social service is lost somehow in the governmental machinery. Thus far the communistic state has been successful only as a theocracy or a tyranny. And a state ruled over by a detached few is not cooperative: nor can it be democratic or just.

The paternal discipline is that applied to the people of a nation from the outside. The people are chattels of the state, having no control over its actions, the state having a glory and a prosperity wholly independent of the prosperity and happiness of its people. And by the same token, its rulers must govern by divine right, else they could have no sanction at all. There are but two sanctions for government, the one the will of the people, the other the divine right, by which the reigns of power were snatched from the people before they were born.

Under paternal discipline, the citizen has no rights save those accorded to him by his overlords of the state. The forms of democracy under paternalism are forms only useful to keep him amused while his neighbor peoples work out their experiments in liberty.

Most men in every nation are laboring-men. In democratic discipline in his degree, each man chooses his place of labor, and rises or falls

according to his own ability, fitness or training. A low estate at birth is no bar to his future exaltation. It is the essential feature of the paternal discipline that most men stay where they are put. Freedom is defined as that of cheerfulness which results from satisfaction at having any place at all in a world which is said to be overpopulated.

The son of a working man finds himself in face of a multitude of trades. He is sent perforce to a trade school, and is relieved from the menace which threatens unskilled labor. The fees are low, as is also his capacity for paying them. The differences among men are reduced to their lowest terms. He finds himself in some definite niche in the industrial machine. Government intelligence offices find his place for him. Government insurance keeps him there. He can not well fall below his class. He can not easily rise above it. For his modest future he must depend on his savings, not on promotion. The university, the professional school, are out of his reach, except in the rare event of being a born prize-winner, or the equally rare possibility of marrying rich. It is blue blood, not red, that mostly attracts heiresses, the world over. Universal compulsory education, technical as well as academic, forms part of the paternal system and this saves even the weak-minded from absolute incompetence. Three years of military service, under graduates of the barracks, break the individual will and leave a docile subject in all further discipline. In its "unescapable stimulus to patriotism," it fits its subject to obey the orders of higher authority without asking for reason why. The industrial value of such discipline is plain. The employer can count on skilled labor and labor that is well drilled and mostly free from the noxious spirit of individualism. To escape from his industrial position usually brings only discomfort and failure if nothing worse. The feeling of injustice works itself out in vague grouches and vaguer unrest, not in those positive efforts for change which threaten industrial serenity in nations which encourage private initiative.

In Prussia, it is said, a citizen has three duties, "Soldat sein; Steuer zahlen; Mund halten" (be a soldier; pay taxes; keep your mouth shut). These are simple, and they do not encourage initiative. Nothing is said about eternal vigilance which, as we know, is the price of liberty. Under this system, liberty gives place to security, and being a soldier, this security is precarious, for the business of the soldier is war.

Under universal conscription the individual loses his rights without acquiring duties. The task of the soldier is not his own nor that of society. He is held in subjection to a central power. In this discipline the people exist for the welfare of the state, the highest purpose of the nation being that of collective efficiency.

The workman has therefore the choice between the docile acceptance of a fate not wholly intolerable and revolt with certain misery. State insurance against poverty, unemployment or old age guards him against

total failure and at the same time cuts the nerve of any effort to gain such security for himself.

Price Collier observes:

> Real orderliness is born only of individual self-control. To deprive the worker of his choice of expenditure, by taking all but a pittance of it for taxation, is a dangerous deprivation of moral exercise. To be able to choose for oneself is a vitally necessary appliance in the moral gymnasium even if here and there one chooses wrong. It is a curious trend of thought of the day which proposes to cure social ills by weakening rather than by strengthening the individual. If the state is to take care of me when I am sick or old or unemployed, it must necessarily deprive me of my liberty when I am well and young and busy, and thus make my very health a kind of sickness. If you will have freedom, you will have those who are ruined by it, just as if you will have social and political servitude, you will have a stodgy unindependent populace.
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> The various forms of Labor Insurance alone in Germany cost the state over $250,000 a day. . . . No wonder that between the care of a grandmotherly state and the attentions of a subservient womankind the male population increases. . . . Nowhere has socialistic legislation been so cunningly and skilfully used for the enslavement of the people. No small part of every man's wages is paid to him in insurance; insurance for unemployment, for accident, sickness and old age. There is but faint hope of saving enough to buy one's freedom and if the slave runs away he leaves, of course, all the premiums he has paid in the hands of his master.

The difficulties which beset the common man in trying to rise from his class—to enter one of the learned professions or the sublimated caste of the army—deter all but the most gifted from ambition for advancement. Only real genius for scholarship or for money-getting can break the bonds of caste. This system minimizes the miseries of poverty while at the same time it checks initiative and independent thought in the mass of the people. To say that "it solves the problem of poverty" is to mistake veneer for reality. The body of the people under paternal discipline in any country are miserably poor, and the lot of those outside ranks of skilled labor is pitiable in the extreme. There is no solution of the problem of poverty which takes away the need of each man to try to solve it for himself.

There can be no true greatness of a state except through the greatness of the human units for whose welfare the state should exist. The whole world suffers to-day from the domination of a great state over a people which has lost the power of self-direction and which has abdicated the duty of government, abandoning them to the will of a military aristocracy, whose chief concern is anything save the welfare of the people.

The subordination of individual freedom to a prearranged efficiency naturally culminates in the organization of fluid force as military power, the extreme opposite to democracy. The individual under martial law has no opinions, no rights, no existence save as a fragment of humanity to be used by the state at its will. The soldier exists for war

and war is the failure of government in its highest functions. In the words of Havelock Ellis,

> To glorify the state is to glorify war, for there is no collective operation which can be so effectively achieved as war, and none which more conspicuously illustrates the sacrifice of the individual to the nation.

It is for this reason that militarism has been through the ages the right arm of privilege as the state church, the form of religion which ignores the individual man, has always been its left arm.

Writers of the day frequently contrast "Germany's success in solving the problem of poverty" with "the wretched condition of England's poor." It is said that "England has the most ungrateful and laziest poor to be found in any land," and these poor are said to be as unpatriotic as they are lazy. They are blind, too, for the pauper vote of England is almost solidly opposed to the efforts of those who would use public action in betterment of their condition.

From this it is argued that as England is a land of freedom while Germany is a land of efficiency, the ideals of freedom need reconsideration in the direction of paternal discipline.

Miss Prestonia Mann Martin observes:

> The two forms of government are to-day on trial. The watchword of democracy is freedom. The watchword of paternalism is duty. Followed to their conclusions, one leads to anarchy, the other to its opposite, socialism. One tends to decentralize government, the other to centralize it. One aims at individual independence, the other at national efficiency. One places the highest value upon freedom, the other sacrifices freedom for the sake of order, system, power, security.

This analysis is true, so far as it goes, but the end of democracy is not freedom, nor yet opportunity, the two meaning much the same thing. The ideal is also duty, but duty self-imposed, or arising from a feeling of the needs of society, not duty imposed from without.

The need of Great Britain as I see it is not more governmental system. The "sodden misery of the London slums, the horrors of the black country," the exhaustion of the countryside, the failure of the yeomanry, these call for more freedom, not for paternalism. "The inevitable toll of corruption and incompetence" is not a result of freedom. Its historic roots lie in the struggle for imperialism. They can never be absent under any form of government, so long as men are greedy or incompetent. The predatory rich and the desultory poor occur under all forms of government, and in some fashion or other the one will feed on the other and both are parasitic on the common weal.

The men who stand for more freedom in England are the men most eager to do away with needless misery and sorrow. The evils in British society are not results of democracy, but legacies of the era of aristocracy,

paternalism and imperialism. British polity still rests on inequality before the law. The statute of primogeniture thrusts the hated principle of precedence into every family. The state church discriminates against personal religion. The governmental effort not long ago to strengthen the landed aristocracy gave to England and Scotland their insoluble land problems. Only in very recent years has the free school found place in Great Britain. The holding of India at the public cost for private exploitation has enriched a very few at the expense of the very many. The wars in India and Africa exhausted in large degree the British yeomanry, while those whom war could not use slid down the line of least resistance into the slums of the great cities. There they have bred generations of like incompetents in an atmosphere of drink and vice. The young men of parts have been used and used up by the thousand in the colonial service. The weaker elements have multiplied while fine strains have been destroyed.

The liquor interests have filled Great Britain and Ireland with race poisons, and these in aristocratic times waxed so powerful that the democracy has as yet failed to dislodge them. In brief, the ills, political and social, of Great Britain have nowhere their origin in democracy, but in governmental abuses and inequalities against which British democracy, one of the strongest and most devoted of all world forces, is manfully struggling. And the most disastrous of all elements of evil, the war system, is wholly undemocratic. It has been brought on, not because democracies are "loosely organized, careless and disorderly," but because "compact brotherhoods which have been welded into a family-nation by the fostering care and the strict discipline of a paternalistic government" have become politically so incompetent that they are driven like sheep into a war which they did not want, which could bring them nothing but ruin and which in its inception and consummation constitutes in itself the most heinous crime ever perpetrated in the history of Christendom. And all this at the dictation of a very few men whom even yet the nation has failed to identify. When the whole story is told, the lesson we must read is that the remedy for the shortcomings of freedom is more freedom, that personal initiative counts more, even in national enterprise, than any form of enforced efficiency, that the need of free states is not less freedom, but more justice, for justice sets men free, and that the worst possible test of a nation's greatness is found in the mischief she can do to her neighbors in blind leading of the blind to the field of battle. That battlefields still exist is due to the failure of justice and therefore of individual freedom.

It is true, as has been stated, that

> State socialism as Germany is demonstrating demands the price and then delivers the goods.

But what terrible goods this system stands ready to deliver!

The democratic discipline, self-imposed by men who think and act for themselves, is effective in making men, and it is the initiative of individual men which makes and marks history.

The social discipline which springs from individualism is effective in building up human society, and the inspiration which rises from the thought of cooperative help is the best antidote for the greed of unchecked and perverted individualism.

The paternal discipline provides in its degree for material comfort and security. It takes away the necessary incentive to every man to solve his own problems. In a free state, the sober and honest working man should be free to abolish his own poverty, to enhance his own security or that of his family through insurance—or at his own discretion to let it alone.

DEFENDING AMERICA

By WM. J. ROE
NEWBURGH, N. Y.

THE problem of discovering or inventing a method of preparation against aggression which shall be acceptable to the entire American people is now presenting itself for solution with an insistence never before so strong or determined. Until in August a year ago the war-cloud broke over Europe, with the solitary exceptions of those versed in the swiftly increasing powers for defence and offence of the continental nations, or aware of the continually strained racial relations, the average well-meaning citizen of the United States seemed fairly confident that something very like a millennial dawn had come. Good people, respectable, well educated, church members, in their way patriotic, but a little over a year ago were saying to each other and sometimes in print to other citizens, that the world had progressed too far along the broad highway of progress for anything like a great war again to disturb the repose of the nations. The recent records of South Africa and our own war with Spain these excellent people dismissed as mere incidents of a universal slowing down of humanity's depraved instincts, or rather perhaps as "growing pains" of the angel of peace.

With all their education (for almost invariably these excellent theorists and impractical interpreters of principles which passed with them as "religious," were "educated") the philosophy of history and the rudimentary elements of psychology had taught nothing concerning the realities of the past or the prospects of immediate present or remote future. One would think that with the great European war a full year upon its course, with no end as yet in view upon the most optimistic horizon, these genial optimists would somehow or in some degree have revised their estimates of probability, or at least have devoted some serious attention to those dilemmas of our past which when understood so completely refute the arguments of "peace at any price" idealists.

Unfortunately the hideous spectacle of the European conflict, instead of having turned the attention of the ultra-pacifists to the untenability of their amiable sophistries, seems to have greatly increased their ardor in the cause of pacification, and immeasurably to have intensified the clamor of ignorant opinion as to the method of insuring peace.

Believing (with the astronomer) that it is only by determining points upon the orbit of the past that man is able to forecast at all the

trajectory of the future, the sane peace lover calls attention to the incidents of our war for independence. "Why!" the peace-at-any-price person responds, and sometimes with no little display of spirit, "Why, my dear sir, that was a righteous struggle; the people rose like one man, and drove the tyrant from these shores." It is in vain that you point to the fallacy of this harangue. It would of course be the rankest of heresies to claim—in spite of the lengthy list of iniquities in the preamble to our declaration—that George III. was not so much of a tyrant, after all, and that the war of liberation from British sovereignty was fought "on a preamble." But this is true, nevertheless; the thirteen colonies sought freedom because they were tired of being "bossed." They found pretexts for revolution in Patrick Henry's "Give me liberty or give me death," and in that excellent and serviceable aphorism; "Taxation without representation is tyranny." The people of the colonies won their freedom, and used it to their hearts' content to establish states, which ever since have taxed unrepresented—or inadequately represented—sections, with hardly a murmur, certainly without a hint of revolution.

But this is not the only—nor the worse—fallacy. The people rose like one man, did they? Most assuredly this was not all that happened. They rose indeed, everywhere along the seaboard from the province of Maine to the far South; but it was like a mob they rose, untrained, insubordinate, in general fair marksmen, but for squirrels rather than men, splendid material for armies, but so ill disciplined—at least till Washington took them in hand at Cambridge—that their assemblages were more like training-day musters than the van of war. Great man as he was even Washington could hardly have succeeded in molding mobs into soldiers if his efforts had not been finely aided by those gallant Germans, Steuben, Pulaski and Du Kalb. Indeed the philosophical analysis of conditions resulting in final success of American arms at Yorktown discloses most certainly that independence was due to three prominent factors: the gallantry and "war-sense" of Benedict Arnold at Saratoga, bringing about Burgoyne's surrender, and thereby the French alliance. Without that and the cordial aid of La Fayette, De Fleury, Rochambeau and others of that military nation, Cornwallis would doubtless have dealt with our forces on the York as easily and cleverly as he outflanked and outmanoeuvred Washington at the Brandywine.

And the war—so called—of 1812, what a wretched account of themselves our hastily gathered land forces gave; with the single "saving grace" of New Orleans, fought after the war had ended, the records include merely a discreditable series of defeats, routs, retreats and surrenders. Only the audacity and skill of an ill-prepared, manned and munitioned navy saved the country from total and irremediable dis-

aster. But fortunately the navy was audacious and skillful; it fought everywhere "to a finish," gave us a very real standing upon the high seas, and as a priceless heritage the illustrious names of Decatur and Lawrence and Porter and Perry and MacDonough, and their many hardly less worthy subordinates.

In Mexico, for the first time in our history (apart from the services of the few graduates of West Point, mainly utilized in the construction of fortifications in 1812–14) the country had the benefit of a large number of officers trained at the Military Academy in the science and art of warfare. Under the able leadership of Scott, Wool, Worth, and Harney these young "graduated cadets" so efficiently led the few thousands, mostly volunteers, against a nation in arms, that peace was achieved in a few months, which otherwise might have required many years.

To recount the incidents of the opening of our great Civil War, or even to touch upon them with a too truthful pencil, would, it may not be doubted, in any other country in the world, be to awaken memories that had better be left to slumber and oblivion. But to Americans of to-day the horror and the gloom of half a century ago have passed forever; to us—South and North—the years when the land was "drenched in fraternal blood" are no more than the wars of Marius and Sylla, or the roses—white and red—of the rival lines of Plantagenet.

The peril of "states dissevered, discordant, belligerent," was averted by force of arms. Arguments failed, or intensified the rancor; diplomacy was unheeded, compromise scornfully rejected; there remained only force, the first appeal of passion met by the last resort of patriotism. Force succeeded, but at what a frightful cost! hundreds of thousands of lives, billions of money. It can not be said that surely all these expenditures might have been saved if in the year 1861 we had had a force of fifty thousand men in arms. But though such a force, guided by one calm cool head at Washington, might not have averted the conflict, the strong probabilities are that at least they would have served to give time for passions to subside, and for reason to resume her rightful sway.

The almost total unpreparedness of our scant land forces at the outbreak of the Spanish war had the effect—temporarily at least—to call the attention of the nation to our deficiencies. For a time the glaring maladministration of military affairs of the department at Washington was a public scandal; that we won, and so quickly, was due largely of course to the very great efficiency of the small navy, but far more that the Spaniard, though passionate as he was valorous, was yet no fool; he recognized and accepted the inevitable, even though his forces in Cuba overmatched our own in numbers nearly sixfold.

Since the peace of Paris our military affairs have been placed upon

a basis far exceeding anything previously known to ensure efficiency, especially by the establishment of the General Staff, replacing former lax administration by a supervising authority, coordinating all branches of the service under a single responsible direction. Unhappily for the strength of our armament for defense on land, while there has been no increase of forces authorized by Congress, the necessity for an increase has come from the very considerable territorial expansion consequent upon the acquisition of the Philippines, Porto Rico, the Canal Zone, and the islands of the Pacific. Adequately to police these new possessions—saying nothing of their defense against possible foreign aggression—would require an army very much larger than that now established by law.

The American people as a whole are very easily scared (that is, startled), but very difficult to frighten (that is, to disturb by fear). To say this is in a way complimentary more to the value of our emotions than to our reason, for certainly the courage of the naturally timid and "nervous" is more commendable than the stolid bravery that merely lacks imagination. But it is unfortunate, for, as all of our emotions are designed for utility and not brutality, fright has its use in way of warning, distinctly notifying the frightened to take steps to avert the threatened danger. But Japan signified unmistakably her vexation, and Mexico her contempt, without arousing the American people to a consciousness of either possible peril or certain responsibility. We disregarded Japan's grievance as of no real importance, and as for the Mexicans, knowing that from them was no danger of invasion, we have given absolutely no thought to what the future may disclose concerning our obligations as trustee according to the Monroe Doctrine to foreign powers.

From this condition—a mingling of bravado, apathy and indifference—the great war in Europe has thoroughly aroused the American nation. All over the United States, from politicians, editors, essayists, "militarists," and "peace-at-any-price" people, come addresses, pamphlets, articles, serials professing to forecast perils from foreign invasion, while societies are being organized, some to stimulate interest in military affairs, and some to discourage such interest, even to the extent of endeavoring to affix a stigma upon the soldier by ostracism and unpatriotic ditties denouncing him as a murderer.

And this discordance is further complicated by varying opinions concerning the respective merits of the causes now rending the continent of Europe, opinions for the most part expressed guardedly and with at least some consideration for others, but fixed in racial sympathies.

At best the position of a neutral nation in any war of considerable magnitude is liable to become perilous, especially to a nation having an

extensive foreign commerce. We know what occurred over a century ago when Europe was overrun by the armies of Napoleon—that international compacts were disregarded, the rights of neutrals ignored, and our own merchant marine threatened with annihilation by paper edicts. A similar process has already been begun across the Atlantic; already we have had thrust upon us a "Berlin decree" from Germany, and "Orders in council" from Great Britain. Doubtless the offense of Germany against the law of nations has been by far the most flagrant; but Great Britain—by interfering with the trade of one neutral nation with another—has exhibited a disregard of that law in relation to our trade with countries bordering upon Germany, which (notwithstanding our own precedents) has caused strenuous remonstrance. That both nations—with great civility and with deference to our colossal growth since 1800—set up as a plea in bar of action a necessity justifying—or condoning—action, merely adds to the difficulties which already confront America, and which are certain to continue and increase as trouble-making incidents.

As never before in our history we are surrounded by conditions and latent grievances liable at almost any moment to take on the shape of antagonisms. In venturing to point out—one by one—the chances of the future, it is not to invite unfriendly feeling towards our neighboring nations, but solely that with calm dispassion we may view the facts, having always in mind that great certainty, that adequate preparation to repel an invader is better than enormous armaments to expel him.

With Japan we need not, I think, concern ourselves unduly. This is not to minimize the danger of a disruption of friendly relations owing to further inimical legislation by states of the Pacific coast or to a possible attempt at colonization of lands theoretically under our protection; but mainly that the Japanese are too poor and at the same time too clever seriously to incite our hostility. Poverty alone will never deter a high-spirited nation from seeking reprisals for real or fancied wrongs, and cleverness alone is apt to lead (as in the case of the German Kaiser) to over confidence in cleverness; but the two combined are fairly good safeguards against aggression.

But it is not against the probable so much as the possible that America ought to be prepared. In the present state of our defenses on both land and sea, war with Japan would mean the immediate loss of our Asiatic, and probably of our Pacific, possessions; the Philippines, with Samoa, Guam, and almost certainly the Hawaiian islands, would—temporarily at least—be lost to us. That they would not stay lost may be reckoned upon, and this is known to the keen intellect of the Japanese, perhaps even more thoroughly than to ourselves.

But why should America depend upon the forbearance of an alien—

however induced—for our first line of defense? Especially is this undesirable when already we possess outlying salients susceptible of being so fortified as virtually to insure us against invasion of our continental territory. Already we are fortifying Pearl Harbor in Hawaii, and it needs only similar fortifications of one of the Aleutian islands, with Guam and Samoa in the far southeast, with perhaps by treaty another base at the Galapagos, to establish bases for swift offense against the supplies of an Asiatic enemy and for protection of the Panama Canal. So protected by outlying fortresses having defensive relations, we should be virtually invulnerable from an Asiatic assault. As compared with the probable loot of an invader on the western coast the expense of constructing and maintaining such defenses would be inconsiderable.

Curious as it may seem, while invasion by a Mexican army is something to be contemplated with complacence, the danger which may arise from that quarter is far more menacing. At the present moment of course the powers of western Europe have enough to do without seeking trouble in America. But suppose there had been no war to engage the attention of either Great Britain or Germany; is it likely that either country would have permitted the spoliation and murder of its citizens to go on as it has for several years, life and property at the mercy of one or the other of a number of irresponsible bandits? Certainly that could not have been expected. With courteous diplomacy no doubt, due deference being accorded to our Monroe doctrine, a demand in no uncertain terms would have come long before this; we should have been required either to "fish or cut bait"; either to act the part our doctrine clearly calls for of collecting agent, or to let the creditor do his own collecting unvexed.

At the present time of writing signs are not lacking that the extraordinary patience heretofore held to by the administration at Washington is on the verge of exhaustion. An endeavor has been made to secure the moral support of the stable South American countries in an appeal to the contending factions. Even yet it seems doubtful whether the only sort of action that can possibly be effective is contemplated; more likely the policy of pottering procrastination will continue. The ultra peace lovers and optimists will tell you that there is no need of haste, assuring you that the close of the European war will find the nations so battered, so weary of strife, and so exhausted financially as to be unwilling or unable to turn their attention to the redress of wrongs suffered by their citizens in Mexico. Such imaginings are wholly erroneous; as never before will the armies of the victors in that great struggle be in shape for further conquests, while the very fact of poverty will be merely an incentive to the replenishment of an exhausted treasury. When that day comes America will surely have to choose between war and humiliation.

These being the inevitable prospects of the future for the American people, certainly it becomes the duty of every thinking citizen to do his part, however insignificant, towards calling attention to the perils, not needlessly to alarm, but soberly, calmly, judiciously, not only to seek a permanent peace, but by far-sighted preparation for a war of strictest defense, to ensure it.

Situated as America is, having an isolated continent virtually to itself, the problem of defense assumes a shape vastly different from that of one of the continental European nations, surrounded by countries whose endemic jealousy is liable at any moment to become virulently epidemic. To a very large number of Americans, probably the great majority, the sudden and violent action of Germany last year seems cruelly and needlessly aggressive. This paper is not written to assail or to defend those actions, but it may be well, while criticizing, if you please, the violation of international law involved in the invasion of Belgium, to put yourself in Germany's place, realizing, if that be possible, her dilemma, believing (as was certainly the case) that hostile Europe lay crouching ready to spring upon her. We know what happened; Germany endeavored to forestall the attack by attacking first and fiercely.

Assuming (though the assumption may be very far from correctly taken) the necessity imposed by an unavoidable antagonism, Germany's action was not only logical, but was called for by the genius of the art of war. The method of that genius has been stated—having been quite erroneously credited to a distinguished Confederate—as "getting there fustest with the mostest men."

A century ago the Atlantic ocean served as a very efficient rampart for resistance against an offensive movement; to-day, when an army could easily be transported to our coast within a month its merit as a first line of defense depends almost solely upon the floating force at our command. In no event probably could any naval armament at our service wholly eliminate all danger of invasion; but to reduce this peril to a minimum, and to some extent to direct the course and point of attack, a very considerable addition to our present navy is not only desirable, but imperative. We need more battleships of the first class, we need swift cruisers, and lesser craft, for offence and for supply, and perhaps more than all, many—little and big—submarines. With an adequate force of all these, and (for both sea and land service) a host of all classes of aircraft, it may safely be said that the best has been done to avert the calamity of an assault from the high seas of an invader.

In one respect America is singularly exposed; the vast preponderance of wealth lies directly upon our Atlantic frontier; Boston, New York, Philadelphia, Baltimore and Washington are all either directly on the seaboard, or within easy striking distance of some point of disembarkation of an enemy. It is not difficult to forecast an invader's inten-

tion—to concentrate his force, for purposes of loot or ransom, against these rich nuclei of treasure.

As on a preceding page I have pointed out the propriety of fortifying various islands of the Pacific ocean as the simplest and least expensive method of defense against an armed attack from the far East, so—for the best defense of our seaboard metropolitan cities—I wish most emphatically to call renewed attention to the project (so long and so ably urged by the "Atlantic Deeper Waterways Association") of constructing ship canals capable of passing the heaviest battleships, between existing navigable channels "from Boston to Beaufort" and beyond. Especially should there be deep waterways from Boston—inland—to Narragansett Bay; thence back of Point Judith to connect with Long Island Sound (defended by a powerful work to be constructed on Block Island); again via the Kill-van-Kull and across the state of New Jersey, to the Delaware, and, more important still, across the Maryland-Delaware peninsula to deep water in the Chesapeake bay.

The great fortification planned and now in process of construction opposite Cape Henry at the entrance to the Chesapeake will eventually tend to safeguard that extensive inland sea and the cities of Baltimore and Washington. With an artificial channel adequately defended from the upper Chesapeake to the Delaware, the extreme danger of an enemy's establishing a base somewhere on the Chesapeake (most available of all locations) could probably be prevented.

The general purpose and necessary brevity of this paper precludes anything like a detailed statement of the present inadequacies in way of land defenses of our cities and harbors. On the supposition that our seagoing defenders have been baffled in their endeavor to prevent an enemy from landing upon our coast, and establishing there his base, from which he proposes to advance, it may be well in as few words as possible to outline the composition of our land force upon which—and now upon which alone—we must rely, either to drive the enemy back whence he came or at least to prevent the destruction or spoliation of our great cities.

The personnel of the land defense divides naturally into these general classes: the stationary defenders (consisting at present of 170 companies of an authorized strength of 104 men each) who man the seacoast batteries, the "mobile army," the "supply," and the "transportation."

The bulk of a "mobile army" consists of infantry, that is of bodies of men, divided into companies, battalions, regiments, brigades, divisions, and army corps, who rely—as final resort—upon their own legs to carry them into action; of field artillery, armed with large-caliber, long-range guns, smaller "mountain guns," with "machine guns" the latter usually attached to the infantry, but which may be drawn as the others are by horses or mules, together with their attendant "limbers" and "caissons" carrying the immediate supplies of ammunition. Besides these arms is

the cavalry, differing but slightly in training and arms except that they are mounted, Whose purpose is ordinarily scouting in small detached bodies, or—should such action become desirable—for raids on a large scale, or even, in some contingency quite remote in modern warfare, for a charge *en masse*.

In addition to these three branches of the service of an active army—infantry, cavalry and field artillery, a number of auxiliary troops are required to make up a complete and efficient fighting force. The engineers make and repair roads and bridges, construct earthworks and lay pontoon bridges when required; the signal corps, the aviators, the medical department, and the quartermaster corps, having in charge all matters pertaining to the feeding, tenting, paying, transporting, and clothing of the troops. There are also other staff departments, consisting of officers only, who are charged with details of administration.

While the questions of supply and transportation of a mobile army fall naturally and mainly upon the quartermaster and his assistant officers and the men of their command, many other considerations enter into the carrying out of the various problems as they arise. Not the least of the perils which might arise from invasion is that almost all the sources of arms and munitions in this country are located not very far from the Atlantic coast, and so within striking distance of an invader. Upon our Ordnance Department rests the responsibility of making and supplying guns, cannon, machine-guns, and small-arms, as well as ammunition—explosives and projectiles of all kinds. The arsenals and armories under the control of the War Department are even now, and would be of course to a greater extent in time of actual war, supplemented by the output of private concerns.

Thus theoretically may be described the essential elements of America's defense against a possible future assault by an enemy having a measurable command of the high seas sufficient to convoy in safety adequate armed forces in strength and numbers really threatening. For the purpose of repelling such an invasion, not only should all of our seacoast forts be manned and officered by a largely increased number of technically trained artillerists, but the fortifications—especially those guarding the approaches to the great cities—should be vastly strengthened—single forts and batteries united in a continuous line of defensive relations, in effect converting scattered groups of isolated works into one scientifically planned fortress. Doubtless at the first sign of real threatening word from Washington, flashing over the wires, would send local commanders to the task of further fortifying in earnest. But the conviction can not be escaped that such hasty preparation would come too late.

As for that "mobile army" which has been briefly described, in general terms this should be distributed perhaps into say three or four grand divisions; one somewhere in the far-south, located so as best to defend

the Texan frontier and the Gulf ports; one somewhere not far from Washington; another probably near Trenton, N. J., and still another at some point in New England about equidistant between Boston and New York. Each section of the active army should be composed of every element, should have at easy command both material and personnel for replenishment of inevitable losses, and each should be so located that by railway and highway and perhaps waterway lines prompt and decisive access to the enemy's landing place might be effected; be ready in short not to await the initiative, but to take it.

To write in this lofty way of fortresses and armies, and of taking initiatives with a view to driving an enemy promptly from our territory, must, I am well aware, appear quite ludicrous to military men. With a force of coast artillery wholly inadequate already, and a "mobile" force so tiny as to be utterly meaningless, to speak of defense, much less of victory, seems like very real mockery. To-day (I have no hesitation in saying) if any one single European power of the first class sought war with the United States, and was left unimpeded by any other great power, this country, in spite of its wealth, its numbers, its patriotism, would be hopelessly helpless.

The saying has been credited, I know not how truly, to a very honest, very religious, but very misguided politician, that in the event of a foreign power seeking to subjugate us, a million armed men would spring up over night to defend our beloved country, and to drive the foe from our shores. Such "spread-eagle" declamation may sound well in a Fourth-of-July speech, but practically it signifies worse than nothing. You may remember that when Julius Cæsar had crossed the Rubicon, and was advancing upon Rome his rival Pompey said to the populace: "Give yourselves no concern, Quirites, Rome is quite safe; all I have to do is to stamp my foot and many legions will arise to meet and vanquish Cæsar."

Most of the Roman citizens were well enough satisfied with this; they said to one another that Pompey was a great man, at least that he was a lover of peace, and had a fine gift for phrase-making. But before long news came that Cæsar had taken Corfinium and captured the army of Domitius. So the citizens came again—this time in a hurry—to Pompey's house, to say: "You promised to provide legions to defend us from Cæsar by stamping your foot; we merely wish to say that the time has come to stamp." Pompey was very polite to his callers, and replied that he would see that something was done; but nothing was, and when next we hear of Pompey it was as a fugitive from Pharsalia.

The analogy of the above anecdote is defective in several particulars; our people are by no means as ignorant or as apathetic as the Romans were, and certainly few of them have any sort of confidence that a defending army can be raised over night. In fact it is not the lack of stamping that is the trouble (for everybody seems busily engaged at

that), but that no one appears to have stamped for exactly the right thing, or at least not in exactly the right way. Some—the so-called ultra "militarists"—are demanding an immediate and huge standing army; some—the extreme "pacifists"—claim that a policy of complete non-resistance is the one most likely to be effectual. These good people quote the saying of the Master moralist of all time, as to his duty who is smitten upon the one cheek to turn the other also, forgetting that it was said as strenuously and by the same authority: "How can one enter into a strong man's house and spoil his goods except he first bind the strong man!"

And between the extremes of "militarism" and "peace-at-any-price" how many varieties of urgent opinion are voicing their views! Some advocate compulsory teaching of tactics in the schools, some have great hopes from "boy scouts," some, scandalized at the idea of any increase in the regular army—as likely to "imperil our liberties"—would be glad to see the militia of the several states amplified to almost any extent, and some, good citizens, having the welfare of the country at heart, establish drill organizations, learning something while having an enjoyable outing. Not one of all these notions and experiments but has in it elements of value, and no one would seek to disparage them; but in fact, in the event of a real war suddenly thrust upon us, all of these put together, including even those "continentals" now recommended to Congress, would hardly prove a feather's weight towards that dynamic force which alone could suffice for defense. Probably the method and purpose of the organizations known as "The American Legion" and the "National Security League" whose headquarters are in New York City, are more likely to prove efficient as an auxiliary to a national army rightly recruited, organized, and officered, than all other adjuncts or volunteer aids combined.

The question of establishing an armed land force sufficiently numerous to repel any invasion at all likely to threaten the country must be considered from two different standpoints; first, as to what may be done by Congress under the constitution and the laws, and, second, what is feasible in view of the traditions of the American people and their evident distrust of any considerable "standing army."

The constitution gives to congress the right to raise and support, govern and regulate an army, of which the president shall be commander-in-chief. Inasmuch as no limitation is placed upon the size of the army, manifestly it is within the legal powers of Congress to call every able-bodied citizen to serve as a soldier—to adopt if it sees fit the absolute militaristic system common to the countries of continental Europe, a system which finds perhaps its best illustration of combined efficiency and expediency in the military administration of the Swiss republic.

Included also among the powers expressly delegated to Congress is that which gives the right of "organizing, arming, and disciplining the

militia" and for employing these state forces in the service of the nation. The sole restriction upon federal authority over state troops when called into active service is that to the states is reserved the right to designate the officers and to do their own training subject to congressionally prescribed methods of discipline.[1]

Manifestly it would be quite impracticable to introduce the Swiss system in its entirety into this country. The people would not submit to so radical an alternative, and again such a huge force, even if it could be officered, supplied or transported, would be too cumbersome and unwieldy for anything like efficiency. Our total present force consists of about 90,000 regular troops, and something over 100,000 militia all told, in all subject to the call of Congress and the President to-day, almost exactly 200,000 men under arms. Between this force and a "levy en masse" the golden mean of availability must therefore be found. That "volunteering" can be seriously relied upon to furnish a competent army of defense must be dismissed as untenable, if only because of the time required to convert an "armed mob" however patriotic, into veteran troops.

Having in view all the circumstances, conditions, resources and prospects—most of which have been at least touched upon, however lightly in this paper, it will be for the president to recommend and for Congress to enact such measures as shall most surely guarantee to America that assurance of safety from aggression which just dealing and diplomacy may go far towards effecting, but which an armed force of suitable strength, well armed and munitioned, and ably led alone can insure.

The virtually unanimous opinion of military men, founded upon the known results of practical experience of foreign countries and with our own army, and modified by an intelligent understanding of democratic needs and prejudices, is convincing that Congress should provide forthwith somewhat as follows:

I. For a very considerable increase of the *coast artillery*, the total, officers and men, to aggregate nearly if not quite 50,000.

II. Providing for an increase of the present *mobile force*—infantry and cavalry—the total to be not less than 150,000 and perhaps need not be more than 200,000. The grand total of the regular army to be from 200,000 to 250,000, preferably the larger aggregate.

III. Providing for an enlistment period which may be approximately eight years, of which two or three shall be *with the colors*—that is in active service, the balance of the enlistment period to be with the *reserve*, subject however always to rejoining the colors. These reserves to be adequately paid, but unrestricted as to occupation.

IV. Providing for prompt *expansion* of the active army in case of

[1] See Constitution, Article No. I., §§ 11, 12, 13, 14, 15, and 16, and Article No. II., Section 2, § 1; also Amendment No. II.

necessity, not by creating new organizations (of reserves or volunteer recruits), but by incorporating the reserves immediately, and the volunteers when sufficiently trained, with existing units of service.

V. Providing for an increase in number of *officers;* this to be by adding to the number of cadets at the Military Academy, and by commissioning such graduates of colleges and universities with the higher class of private schools, as may be proficient in an established military course directly under authority of the War Department.

VI. Providing for the accumulation of stores of *war-material* of every kind at depots to be established at inland points, easily accessible by ourselves for distribution, and easily defensible from an enemy.

VII. Providing for strict regulations by which the militia of the several states may more readily and efficiently become incorporated with the regular forces in time of emergency. It is also suggested and urged that state constabularies relieve the militia from ordinary police duties.

The details of method for the carrying out of these and other only less essential provisions should be left largely to a board to consist of chairmen of committees of the House and Senate most directly interested, the secretaries of war and the navy, and those officers of high rank in both services whose position and experience qualify them to suggest or decide between expedients.

While undoubtedly the considerable increase of the army as above outlined would add largely to the expense, several methods of economy may be suggested. That provision concerning length of service as applied to the land forces in general might be materially modified by the establishment of more permanent garrisons "beyond seas"; and a large saving in the item of transportation could be effected by local recruiting. Heretofore, owing to the demands of political expediency numerous small posts, which have long outlived their usefulness, have continued to be garrisoned, entailing in the aggregate a large drain upon funds and men, for both of which better use could be found at stations more suitable, especially for the practise of regimental and brigade evolutions.

Within recent years the quality of men accepted by recruiting officers has very greatly improved; it is suggested that the localizing method of enlistment and the feature of the reserve might still further assist to increase the character, stability and permanency of the men-in-the-ranks. It would be a wise measure to afford to young enlisted men very greatly increased opportunities to attain commissioned rank, and if inclination led and natural ability permitted, that many such should find the way open to making their country's defending a life career. For the so-called "scientific corps"—the engineers, the ordnance, and the artillery—long and arduous training is required; but for the line—foot and horse troops two years or so of due diligence is sufficient. Here the extremely high standard of education at West Point could well be modified. Moral character, physical stamina, a fair general education, with natural capac-

ity for command and willingness to obey; these furnish an ample foundation for the sort of training qualifying for commissioned rank in the line. For advancement to higher grades in the service the experience of the war-between-the-states testifies that time may be trusted to provide its sure tests of merit quite irrespective of that detriment to efficiency—the handicap of seniority as determining promotion.

To make provision for establishing "peace on earth and good will" between nation and nation is no more vital to-day than it has been since first the interests and passions of men began to call for enlightened self-control. And to provide for defense against a world mad with murder, abandoning its own mutual guarantees of civilization is now hardly more essential than it has been for many decades. But the recent shameless spectacle of reversion to barbarism exhibited to-day in Europe and on the high seas has aroused attention to our weakness as never before. It is no fit reply to those who announce the necessity of adequate preparation to cry that war is barbaric. It is barbaric; but so long as barbarians remain upon the earth, it will be the duty of enlightenment to provide safeguards against them.

THE YOUNGER GENERATION OF AMERICAN GENIUS

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1. The Group Under Forty-five

A STUDY[1] of the first ten thousand American-born persons whose names appeared in "Who's Who in America" for 1912–13 showed beyond any reasonable question that up to that time New England had made a contribution of eminent Americans far out of proportion to her population. This fact held true for New England as a whole. Furthermore, the number of distinguished persons per one hundred thousand of population was larger in every New England state than in any other state in the union. So decisive was the advantage of New England that Rhode Island, the New England state with the lowest proportion of distinguished persons per one hundred thousand of population, was 30 per cent. above New York, the state which, outside of New England, had the highest proportion of distinguished persons per one hundred thousand of population.

The ten thousand persons considered in this first study were for the most part well along in life. Only one in a hundred was born since 1880; only fourteen in a hundred were born since 1870. More than a quarter of the eminent persons were born before 1850, making them at least sixty-two years old.

The tables showed, clearly enough, that the advantage of New England over other sections of the country decreased in later decades. Among the eminent persons born before 1850, 30 per cent. were born in New England, which in 1850 reported but 11.8 per cent. of the total population of the United States; whereas for the decade 1880–89 the proportion of eminent persons born in New England was 12 per cent., as compared with 7.5 per cent. of the population reported from that section.

Certain critics insisted:

> That proves the point, the position of New England as the mother of American genius is on the wane. Make a study of the group born since 1870, the people who are under forty-five, and you will see the difference.

This is the study.

During the first three quarters of the nineteenth century, a number of distinguished men out of all proportion to her population was born

[1] "The Geographical Distribution of American Genius," Scott Nearing, *The Popular Science Monthly*, August, 1914.

in New England. Next to New England, the Middle Atlantic and the East North Central states had a considerable lead over the remainder of the country. Was this lead of the northeast section of the United States due to some special advantage that inhered in the race-stock, the climate, the educational facilities, or some like features; or to the mere momentum of tradition and established prestige? Such a question can not be answered categorically, but an analysis of the younger group of distinguished Americans will show whether the tendencies noted in the previous study are so evidently casting laurel wreaths at the feet of New England.

2. The Place of Birth

New England can not claim the same overshadowing position in the production of genius in the younger generation that so clearly belonged to her in the earlier decades. While her position is still good, it is far from commanding.

The figures[2] have been compiled first according to geographical area. The 2,000 distinguished persons are distributed over nine groups of states. The largest number come from the Middle Atlantic states; the smallest from the Mountain states.

TABLE I

NUMBER AND PER CENT. OF EMINENT PERSONS BORN IN THE VARIOUS GEOGRAPHIC DIVISIONS OF THE UNITED STATES, WITH THE PER CENT. OF THE TOTAL POPULATION OF THE UNITED STATES IN EACH DIVISION IN 1880

Geographical Area	Distinguished Persons		Per Cent. of the Total Population in 1880
	Number	Per Cent.	
New England	331	16.6	8.1
Middle Atlantic States	503	25.1	20.9
East North Central States	480	24.0	22.3
West North Central States	235	11.8	12.2
South Atlantic States	226	11.3	15.1
East South Central States	108	5.4	11.1
West South Central States	40	2.0	6.7
Mountain States	26	1.3	1.3
Pacific States	51	2.5	2.3
Total	2,000	100.0	100.0

[2] The figures for the study were secured by taking the first 2,000 persons in "Who's Who for 1914–15," born in the United States since 1869. This was somewhat more than half of the total number of such names appearing in the volume.

"Who's Who" is published in Chicago. The editor, Albert Nelson Marquis, was born in Ohio. "The standards of admission to 'Who's Who in America' divide the eligibles into two classes: (1) Those who are selected on account of special prominence in creditable lines of effort, making them the subjects of extensive interest, inquiry or discussion in this country; and (2) those who are arbitrarily included on account of official position—civil, military, naval, religious or educational—or their connection with the most exclusive learned or other societies." From a statement following the preface, 1914–15 edition.

The real interest in Table I. centers in the relation between the number of people living in a given geographic area and the group of distinguished men produced by this geographic area. Thus New England, with 8 per cent. of the total population of the United States in 1880, produced 16 per cent. of the group of distinguished persons under consideration. The Middle Atlantic states, with 21 per cent. of the population, produced 25 per cent. of the distinguished persons. The East North Central states, with 24 per cent. of the distinguished persons, report only 22 per cent. of the population. The Pacific states, with 2.5 per cent. of distinguished persons, contain 2.3 per cent. of the population. These four sections produced a percentage of distinguished persons greater than the percentage of the total population living within their boundaries. The Mountain states show the same percentage of population and of distinguished persons. The West North Central states, and all of the group of Southern states show a proportion of distinguished persons considerably less than the proportion of the population.

A map of the United States drawn to represent the relation between population and the production of distinguished persons would show New England considerably in the lead, with a proportion of distinguished persons twice as great as her proportion of the population. The Middle Atlantic and East North Central states, while producing a far lower proportion of distinguished persons than New England, produced a far higher number. These three groups of states combined are responsible for two thirds of all the distinguished persons included in this study.

The variation in individual states is considerable. The dominance of the New England states is still evident, though not so marked as it was in the study of 10,000 distinguished native-born persons from the volume of "Who's Who" for 1912–13. From that study it appeared that each one of the New England states individually reported a higher proportion of distinguished persons than any other state in the United States. This situation no longer exists with regard to the younger persons of distinction. Thus, while the number of distinguished persons per 100,000 population in 1880 was 3.9 for the United States, for Maine it was 4.8; New Hampshire, 8.9; Vermont, 5.4; Massachusetts, 10.4; Rhode Island, 8.3; Connecticut, 6.6. Thus each one of the New England states was ahead of the number for the entire country. At the same time, 3 states reported a higher number of distinguished persons per 100,000 population than the lowest New England state (Maine). These states were New York, 5.8; California, 5.1; Maryland, 5.0. New Jersey reported the same number as Maine, namely, 4.8. The fact remains that each of the New England states except Maine reports a higher number of distinguished persons than any other state in the

United States, while Massachusetts, New Hampshire and Rhode Island show a number of distinguished persons nearly twice as great as any other state in the United States.

Another issue is raised when the problem of city environment is considered. The recent developments of city life incident to the growth of the modern industrial world have thrown increasing emphasis upon the necessity for shaping city requirements to meet human needs.

There is a general supposition that the country boy has an advantage over the city boy. That this was not true in the earlier decades was shown very clearly in the study of 10,000 distinguished Americans. The 27 cities which reported a population of more than 20,000 in 1850 contained approximately one eighth of the population, but reported a quarter of the total eminent persons. The same thing is true of the distinguished persons born since 1869.

TABLE II

NUMBER AND PER CENT. OF EMINENT PERSONS BORN IN CITIES HAVING A POPULATION OF 25,000 OR OVER IN 1870, TOGETHER WITH THE PER CENT. OF THE POPULATION LIVING IN THOSE CITIES 1870

	Number	Per Cent.
Total persons	2,000	100.0
Born in cities	640	32.0
Total population of the United States living in those cities, 1870	5,723,496	14.8

Among the 2,000 distinguished persons under consideration, 640, or 32 per cent., were born in the 50 cities reporting a population of 25,000 and over in 1870. These cities in 1870 contained 5,723,496 persons, or 14.8 per cent. of the total population of the United States in 1870. In other words, the proportion of distinguished persons born in the later decades is higher for city environment than appeared in the earlier decades.

The records for individual cities compared with the records for the country at large are indeed remarkable. The number of distinguished persons per 100,000 population in certain of these cities was as follows:

The fecundity of certain cities in distinguished persons is indeed surprising. Cambridge, with 47.5 per 100,000, is far in the lead. Nashville, the second city, with 34.9, again has a considerable advantage over Columbus, Ohio (25.6), and Lynn, Mass. (24.8). Washington falls in as city number five, with a record of 20.2. After this point the cities range themselves with some degree of equality.

The cities which show the highest proportion of distinguished persons per population are not the large cities. Indeed, the large cities occupy a place of distinct inferiority in this respect. Throughout this table of individual cities it is evident that no particular section occupies

TABLE III

NUMBER AND PROPORTION OF DISTINGUISHED PERSONS BORN IN CERTAIN CITIES

Geographical Area	Total Distinguished Persons	Per 100,000 Population 1880
United States	2,000	3.9
Philadelphia	61	7.2
San Francisco	18	7.7
New York City	151	7.8
Baltimore	26	7.9
Buffalo	10	8.0
Richmond	6	9.1
Pittsburgh	13	9.3
Milwaukee	7	9.8
Louisville	10	9.9
Cincinnati	22	10.2
Worcester	6	10.3
Savannah	3	10.8
Detroit	9	11.3
Providence	12	11.4
Newark	14	13.4
Chicago	45	15.1
Kansas City	5	15.4
New Haven	8	15.7
Boston	41	16.3
Portland, Me.	6	17.7
Hartford	7	18.9
Washington	36	20.2
Lynn	7	24.8
Columbus	8	25.6
Nashville	9	34.7
Cambridge	19	47.5

a position of importance. Thus the leading city is in Massachusetts; the second most prominent city is in Tennessee. Most of the cities are, of course, taken from the northern tier of the country, because most of the cities of the country are in this tier; but the southern section in proportion to the number of its cities is well represented.

The proportion of eminent persons born in cities seems to be higher in the later than in the earlier decade. Thus in the decade from 1870 to 1879, 31.3 per cent. of the total distinguished persons were born in the cities; and in the next decade, 1880 to 1889, 36.5 per cent. were born in cities; while the only two persons born between 1890 and 1899 whose names appear in "Who's Who in America" were of city origin.

The supremacy of the cities over the rural districts is well illustrated by a consideration of the relation existing between place of birth and occupation. It should be borne in mind that the 50 cities which reported a population of 25,000 or over in 1870 contained about one seventh of the total population of the country in that year. The per cent. of city-born persons in certain occupations appears in the following table:

TABLE IV

NUMBER AND PER CENT. OF EMINENT PERSONS, CLASSIFIED BY OCCUPATIONS, WHO WERE BORN IN CITIES

Occupations	Total Persons	Born in Cities	Per Cent. Born in Cities
All occupations	2,000	640	32.0
Educators	467	117	25.0
Authors	232	91	39.2
Public Office Holders	216	58	26.9
Scientists	241	60	24.9
Business Men	156	65	41.6
Lawyers	138	50	35.9
Journalists	125	41	32.8
Doctors	102	34	33.3
Clergymen	68	13	19.1
Actors	41	18	43.9
Miscellaneous	214	93	43.4

The clergymen report the smallest percentage of city origin, falling to one fifth. The highest proportion, for actors and authors, show more than two fifths of city origin. Business men appear in almost the same class. A third of the lawyers, journalists and doctors are born in the city, while a quarter of the educators, public office holders, and scientists are of city origin. In every occupation, with the exception of clergymen, the proportion of persons of city origin is far greater than the relation between city and rural population would seem to warrant.

The younger generation of distinguished Americans were born in the north and east sections of the United States. Although the lead of New England is not so pronounced as it was in the earlier decades, it is still considerable. These persons were born in cities. The large cities of the United States, containing a seventh of the population, produced a third of the younger generation of distinguished Americans. The leaders of American life are still coming from a small area in the northeastern part of the United States, and particularly from the cities there.

3. THE TIME OF BIRTH

Little can be said about the period of birth of the distinguished persons under consideration, because almost nine tenths of them were born within the decade between 1870 and 1879. Since the group under consideration must necessarily be less than forty-five years of age, the earlier decade would naturally contain most of them.

TABLE V

NUMBER AND PER CENT. OF EMINENT PERSONS WHO WERE BORN AT CERTAIN PERIODS

	Number	Per Cent.
1870–79	1,771	88.5
1880–89	227	11.4
1890–99	2	.1
Total	2,000	100.0

4. Education

The chief advantage ascribed to New England by many of the critics of the previous study lay in her educational system. Although it was impossible to secure from the biographical records in "Who's Who" any satisfactory statement of the common-school education, there was a very general record of college attendance. The figures showing college affiliation are significant.

TABLE VI

College Affiliation of Eminent Persons

	Number	Per Cent.
No college affiliation	263	13.1
Attended, but did not graduate	190	9.5
Holders of degrees	1,547	77.4
Total	2,000	100.0

More than three quarters of the younger generation of eminent persons are college graduates. The caption, "No college affiliation," may include certain persons who graduated from college but failed to state the fact when they made out their biographies. Almost nine tenths report some college affiliation. Among the younger group of distinguished Americans a college education seems to be a recognized necessity.

For a century the New England and Middle Atlantic states were the home of colleges. Does the fact have any marked effect on the extent of college affiliation? The following table seems to answer the question in the negative:

TABLE VII

College Affiliation of Distinguished Persons Classified by Geographical Area

Geographical Area	Total Persons	No College Affiliation	Per Cent. Having No College Affiliation
New England	331	38	11.5
Middle Atlantic States	503	78	15.5
East North Central States	480	60	12.5
West North Central	235	31	13.2
South Atlantic States	226	25	11.1
All other	225	31	13.8
Total	2,000	263	13.1

The per cent. of distinguished persons having no college affiliation does not vary greatly from one geographic area to the other. It is highest in the Middle Atlantic states, and lowest in the South Central states.

The figures for individual colleges are, however, significant, suggesting again that there is a certain carrying power in vested culture which

is a large asset in the success of the individual who comes into contact with it. Although the figures for individual colleges were in a sense unsatisfactory because they were so scattering, in another sense they were profoundly significant.

TABLE VIII

NUMBERS OF DISTINGUISHED PERSONS GRADUATING FROM CERTAIN SPECIFIED COLLEGES

Harvard	155	U. of Wisconsin	29
Yale	83	Stanford	28
Columbia	52	Massachusetts Institute of Technology	28
Michigan	44	Johns Hopkins	26
Cornell	36	U. of Chicago	26
University of Pennsylvania	36	U. of California	25
Princeton	34		

The persons under consideration were born since 1869. They were therefore graduated for the most part since 1890. If the figures had reference to the middle of the nineteenth century, it might readily be taken for granted that they would pile up in certain of the older colleges; but these graduations have all occurred since 1890, in the age of many colleges. Nevertheless, the piling-up process is evident.

Harvard leads the race and, save for Yale, she has not even a respectable competitor. Among the 2,000 distinguished persons of the younger generation, Harvard has graduated almost as many as Columbia, Cornell, Pennsylvania and Michigan combined; almost as many as Columbia, Cornell, Pennsylvania and Princeton combined; almost as many as Wisconsin, Stanford, Massachusetts Institute of Technology, Johns Hopkins, Chicago and California combined. Harvard and Yale together have graduated 24 more of these distinguished persons than Columbia, Cornell, Pennsylvania and Princeton combined. The supremacy of these two institutions, and of Harvard in particular, is little short of astounding.[3]

The effectiveness of these two institutions becomes even more remarkable when account is taken of the geographical distribution of their graduates. Most of the colleges listed show a great majority of localized graduations. Thus among 52 distinguished graduates at Columbia, 34 were born in the Middle Atlantic states; among 34 at Princeton, 20 were born in the Middle Atlantic states; among 25 at California, 19 were born in the Pacific states; among 44 at Michigan, 33 were born in the East North Central states. The contrast between these institutions and Harvard and Yale is strongly brought out in the following table:

[3] The writer is not a graduate of Harvard or Yale, and has never had any official relations with either institution.

TABLE IX

PLACE OF BIRTH AND COLLEGE AFFILIATION OF DISTINGUISHED PERSONS, FOR CERTAIN COLLEGES

Born in	Graduated from				
	Harvard	Yale	Columbia	Michigan	Cornell
New England States	78	27	5	2	—
Middle Atlantic States	33	23	34	3	22
East North Central States	27	15	7	33	7
West North Central States	6	8	1	2	4
All other	11	10	5	4	3
Total	155	83	52	44	36

Yale, even more than Harvard, seems to have drawn her distinguished alumni from all parts of the country, and both of these colleges have done this in a unique way that is without parallel among the other colleges for which returns were tabulated, with the single exception of Stanford.

The dissenter will argue that the very fact of the wide geographical distribution of the distinguished persons from Harvard and Yale is a proof that the pick of prospective college students, from all sections, choose Harvard and Yale. At the same time, something must be said for the power which an ideal of culture may exert. If it is true, as many historians assert, that the spirit of Athens and Rome kindled the fires of genius in their sons, then it may be equally true that the spirit at Harvard and at Yale kindles the fires of genius in their sons. Culture is a power. Somewhere it must be centered. Both the studies of distinguished Americans which are under consideration seem to show a high pressure area of culture over New England, and centering in her great institutions of learning.

5. Occupations

The persons whose names appear in "Who's Who in America" are almost wholly professional people. Among the 38,167,336 gainfully occupied persons in the United States in 1910, 4 in each hundred were in professions; yet among the 2,000 distinguished persons under consideration, 80 in each hundred were in the professions. Either it is true that professional people make up the bulk of distinguished persons in the community, or else the people who are named from "Who's Who" are picked from the professional classes. Experience would lead to the belief that the leaders are picked from the professional classes.

Educators are far in the lead among the occupational groups. Indeed, they contribute nearly a quarter of the total, and almost twice as large a group as the scientists, who rank next. Authors and public office holders rank close together. The rear is brought up by the learned

TABLE X

NUMBER AND PER CENT. OF EMINENT PERSONS BORN SINCE 1869 IN CERTAIN OCCUPATIONS

	Number	Per Cent.
Educators	467	23.4
Scientists	241	12.1
Authors	232	11.6
Public Office Holders	215	10.8
Business Men	156	7.8
Lawyers	139	6.9
Journalists	125	6.2
Doctors	102	5.1
Clergymen	68	3.4
Miscellaneous	255	12.7
Total	2,000	100.0

professions—lawyers, doctors and clergymen. These three groups, with the journalists, make up a less percentage than the educators alone.

The real surprise in the occupation figures arises out of a comparison between the occupations of the persons of all ages, studied in the "Who's Who" for 1912–13, and the persons born since 1869, included in the present study. Some of the differences existing between the two groups are striking.

TABLE XI

PER CENT. OF PERSONS IN VARIOUS OCCUPATIONS AS APPEARING IN "WHO'S WHO" FOR TWO PERIODS OF TIME

	First 10,000 Native-born Persons in "Who's Who" 1912–13	First 2,000 Persons Native-born Since 1869, "Who's Who" 1914–15
Educators	19.3	23.4
Lawyers	13.6	6.9
Public Office Holders	13.5	10.8
Business Men	9.9	7.8
Authors	9.1	11.6
Clergymen	7.3	3.4
Doctors	6.2	5.1
Scientists	6.1	12.1
Journalists	6.0	6.2
Miscellaneous	9.0	12.7
Total	100.0	100.0

The gains are made by educators, authors and scientists. Scientists, in particular, have doubled their percentage. The greatest decline is shown by clergymen and by lawyers. It seems a little surprising that there should have been a decrease in the proportion of business men.

There is always a possibility that the method of selecting names for the "Who's Who" volume may have changed of late years in a way to place greater emphasis on some occupations, and less on others. At

the same time, daily experience verifies most of the showings made by these figures.

Apparently, community leadership expresses itself through the professions, preeminently. At the same time, during recent years there is a rapidly changing significance in professions. Educators, scientists, authors, public officials and business men now make up the body of leadership. The old-time learned professions comprise a comparatively small element in the whole group of distinguished Americans.

6. The Sex of Distinguished Americans

The most impressive fact which the study of sex distribution among distinguished Americans brings to light is the phenomenally small proportion of women whose names are included. Among the first 2,000 names of American-born persons appearing in "Who's Who in America," only 169 are the names of women.

There is no section of the country in which the number of women approaches that of men. There is considerable variation. The number of women per hundred men is higher in the west than in the east, and higher in the north than in the south. At the same time the ratio is at best extremely low.

TABLE XII

Sex Distribution among the Younger Generation of Distinguished Americans by Geographic Areas

	Total	Men	Women	No. of Women per 100 Men
New England	331	292	39	13
Middle Atlantic States	503	453	50	11
East North Central States	480	448	32	7
West North Central States	235	222	13	6
South Atlantic	226	214	12	6
East South Central States	108	100	8	8
West South Central States	40	34	6	17
Mountain States	26	24	2	8
Pacific States	51	44	7	16
Total	2,000	1,831	169	9

The names of women appear very unequally in the various occupations.

The women listed among the first 2,000 names in "Who's Who" constitute 8.4 per cent. of the whole. There are four occupations as classified in Table XIII. for which the distinguished women are practically non-existent, and two others in which they make but a sorry showing. Lawyers, business men, public office holders and clergymen include 577 men, or 32 per cent. of the total number of distinguished men. The same four occupations report 1 woman, or 0.5 per cent. of

the distinguished women. Add to these four occupations doctors and scientists, and the aggregate of the six occupations is 915 (50 per cent. of all distinguished men). The same six occupations report only 6 (3.5 per cent.) of the distinguished women. The six occupations—lawyers, business men, public office holders, clergy, doctors, and scientists—report 915 distinguished men and 6 distinguished women—a ratio of 0.6 women to 100 men.

TABLE XIII

SEX DISTRIBUTION OF FIRST 2,000 AMERICAN-BORN PERSONS APPEARING IN "WHO'S WHO" FOR 1914–15 WHO HAVE BEEN BORN SINCE 1869—BY OCCUPATION

Occupation	Total	Men	Women
Lawyers	139	138	1
Educators	467	450	17
Business	156	156	—
Scientists	241	238	3
Clergymen	68	68	—
Authors	232	157	75
Public Office Holders	215	215	—
Journalists	125	117	8
Doctors	102	100	2
Actors	42	16	26
Miscellaneous	213	176	37
Total	2,000	1,831	169

The great bulk of the distinguished women listed among the first 2,000 native-born persons in "Who's Who" are educators, authors or actresses. These three occupations, with 623 distinguished men (34 per cent. of the total number), have 118 distinguished women (70 per cent. of the total number). In these three occupations, therefore, the ratio of women to men is 1 to 5.

The one occupation of considerable magnitude in which women approach men is that of author. Of the 232 authors listed among the first 2,000 American-born persons in "Who's Who," 75 (32 per cent.) are women. At the same time, the 75 women authors comprise almost one half of all of the distinguished women whose names appear in "Who's Who."

This showing takes on peculiar significance in view of the fact that until within the last thirty or forty years women were practically excluded from law, public office, the ministry, medicine and higher education, while they were admitted with some degree of freedom to the fields of education and journalism, and could not, in the very nature of the case, be excluded from authorship. It may be true, as some students urge, that women are peculiarly adapted to emotional activities, of which certain lines of literary achievement are typical. At the same time, the searcher after truth may point with equal justification to the

fact that women occupy a position commensurate with that occupied by men in the one profession where they have been given an opportunity.

The figures dealing with the decade of birth lend emphasis to the idea that the failure of women to attain positions of distinction has been due, in the past, to the restriction in opportunity.

Women have been free to enter upon careers that led to public distinction only within the past thirty or forty years. Extensive higher education for women does not date back more than twenty or twenty-five years.

TABLE XIV

SEX DISTRIBUTION OF FIRST 2,000 PERSONS IN "WHO'S WHO IN AMERICA" (1914–15) WHO HAVE BEEN BORN SINCE 1869

Decade	Total	Men	Women	Women per 100 Men
1870–79	1,771	1,638	133	8
1880–89	227	192	35	18
Born since 1890	2	1	1	100
Total.....	2,000	1,831	169	9

Among the distinguished persons born between 1870 and 1879 there are only 8 women per hundred men. In the next decade this number increases to 18, more than double; and in the last decade, where of course the figures are so few as to be wholly undependable, the ratio is even. The later figures will undoubtedly show an increase in the ratio of women to men.

7. CONCLUSIONS

The facts regarding the place and time of birth, education, occupation and sex of the younger generation of distinguished Americans lead to some rather significant conclusions. New England, though no longer supreme, is still distinctly in the ascendant as a producer of American leadership. The leadership comes out of the cities to a far greater degree than it does from rural districts. In certain cities, like Cambridge and Nashville, the fecundity in distinguished persons is exceptional. Among the persons listed in "Who's Who" who were born after 1869, the great majority were born in the decade 1870–79. The younger generation of distinguished Americans consists almost wholly of college graduates. In the list of colleges which have educated these distinguished persons, certain institutions, notably Harvard and Yale, stand out preeminently as trainers of leadership. The old learned professions—law, medicine and the ministry—are losing very rapidly in favor of science and education. There has been a revolution in the source from which community leadership is secured. The younger generation of distinguished Americans is overwhelmingly male; only a

few women have pushed into the ranks, and they are found in only three professions.

The tendencies which were noted in the earlier study of distinguished Americans appear in this later study—some less, and some more marked. Leadership arises even in this last generation from one half of the population, the men; from one small group of the population, the college-bred; from one small geographic area, the northeastern section of the United States; from one small group of occupations, the professions.

MUSEUM FATIGUE

By BENJAMIN IVES GILMAN

BOSTON MUSEUM OF FINE ARTS, BOSTON, MASS.

THE museum in which the photographs here reproduced were taken no longer exists; but the conditions depicted are still well-nigh universal. The museum was the first Museum of Fine Arts in Boston, of which the present great structure on the Fenway became in 1909 the successor. The conditions are those resulting from the type of museum case and of museum installation widely accepted as standards among us.

The photographs were taken with the object of determining by actual observation just what kinds and amount of muscular effort are demanded of the visitor who endeavors to see exhibits as museum authorities plan to have them seen. "Museum fatigue" is an admitted evil, hitherto tacitly accepted as admitting only relief. May not a study of how it comes about suggest some means of prevention?

The method adopted in the inquiry was the following. A series of simple questions was devised relating to certain objects mostly installed at higher or lower levels and in cases; and an observer was photographed in the act of answering them. The observer, an intelligent man with good eye-sight, and well accustomed to museums and their contents, was instructed to answer the questions with the least possible exertion and to hold the positions he needed to assume for the purpose until he could be photographed.

The pictures obtained indicate that an inordinate amount of physical effort is demanded of the ideal visitor by the present methods in which we offer most objects to his inspection. It is at once evident that these methods form an effective bar to the adequate fulfilment by museums of the public function they aim to perform. Not even the hardiest sight-seer will long go through with the contortions which the pictures indicate are needed for any comprehension of much of what we display to him. After a brief initial exertion he will resign himself to seeing practically everything imperfectly and by a passing glance. If the public is to gain more than a minute fraction of the good from museum exhibits which is theirs to give and which now can be gained by the private student, radical changes in our methods of exhibition are imperative. As at present installed, the contents of our museums are in large part only preserved, not shown.

Indeed, we may even go further and claim that in some proportion of the objects put on public view in every museum the qualities for which they are shown are rendered wholly invisible by the way they are shown. They are so placed and in such lighting that it is a physical

impossibility by any exertion of limb or eye to descry the particular characteristics to which they owe their selection for show. This is literally an absurd state of things; yet there would be little risk in offering to point out to any museum curator objects so concealed by their installation in his own museum.

On the other hand, a proportion of the objects in every museum may be adequately seen without any marked exertion. These are the instances in which objects are installed approximately on a level with and near to the eye of the visitor as he stands upright before them. They constitute a minor fraction of museum installations, and are not represented in the accompanying illustrations. Our present purpose is to inquire into the larger proportion of instances in which adequate seeing demands exertion.

The questions and answers here follow, grouped according to the types of attitude represented in the illustrations. The cases called floor cases are from six to seven feet high, two and one half to three feet broad, five feet long, with a main floor at about thirty inches from the ground, and supported either on legs or on a closed lower compartment.

These pictures indicate that the principal sources of that part of museum fatigue which comes from muscular effort to see objects well are two: (1) low installations in upright cases; (2) broad installations in flat or desk cases. High installation may put objects out of sight, but is a minor source of fatigue; while to bring the eye within seeing distance of low shelves is apt to demand bending the knees; and the effort to see objects at the back of wide desk or flat cases requires bending at the hips. The pictures indicate further two ways in which objects may be exhibited in museum cases so as to make invisible some or all of the features which warrant their exhibition. They may, first, be concealed in part by others. They may, second, be placed too far back from the glass to be seen in the necessary detail. The effort of the eye muscles can not be directly shown in pictures, but is evidently considerable and may be hopeless.

The inferences are that museum fatigue would be greatly helped were upright cases to stand higher, flat and desk cases to be made narrower, and all cases shallower from front to back. This shallowing would put an end to the concealment of one object by another by putting an end to the exhibition of multiple rows of objects on the same shelf. All cases would be single row cases. The shallowing would further bring all the contents of a case within the limits of close scrutiny. These inferences from the present experiment may be made more precise by others based on measurements of the human body and of the contents of museum shelves. Estimating the height of the average visitor at sixty-three inches, his eye will be about sixty inches above

I. *Bent.* (*a*) *Hands behind back.*

FIG. 1. *Object.*—An Egyptian panel about six inches square set upright between two jars on a pedestal in the center of a floor case. *Question.*—What is the material of this panel? *Answer.*—Wood.

FIG. 2. *Object.*—Chinese bronze mirrors exhibited in a wall case. *Q.*—Describe the pattern of one of the mirrors in the lowest row. *A.*—A central knob in a square, with knobs about and other patterns.

FIG. 3. *Object.*—A print displayed in a desk case. *Q.*—What are these children running away from? *A.*—A dog.

(*b*) *Hands on knee or otherwise supported.*

FIG. 4. *Object.*—An Egyptian statuette of gold, about three inches high, on a stand on the center pedestal of a floor case, behind an upright lens. The observer was asked to inspect this object and to read its label.

FIG. 5. *Object.*—Electrotype reproductions of Greek coins in a frame hung against the wall. The observer was asked to read the label of a coin in one of the lower rows.

FIG. 6. *Object.*—A painting by Meissonier representing a horseman. The painting was hung on the line. *Q.*—What is represented on the horse's crupper? *A.*—A blanket rolled up.

FIG. 7. *Object.*—A Greek coin exhibited toward the front of a flat case. *Q.*—Describe the device on this coin. *A.*—A cow licking her hind foot.

FIG. 8. *Object.*—Plaster impressions from engraved Greek gems, exhibited in a flat case. *Q.*—The observer was asked to describe the device on one of the gems in the center of the case. *A.*—Two goats.

II. *Much bent.*

FIG. 9. *Object.*—Greek dagger handle with carved top, lying in the center of a desk case. *Q.*—Describe the carving. *A.*—It represents an animal devouring a ram's head.

FIG. 10. *Object.*—A Renaissance crucifix lying on the bottom of a floor case, and bearing an incised design. The observer was asked to describe the design. *A.*—The figure of Christ.

FIG. 11. *Object.*—A fragment of ornament lying on the bottom of a floor case. *Q.*—What does the pattern on this fragment represent? *A.*—A group of five persons dancing.

FIG. 12. *Object.*—A cast of the Venus of Melos. The observer was asked to read the label on the pedestal.

III. *Half-crouching.*

FIG. 13. *Object.*—A fragment of a relief on wood lying flat on the bottom of a floor case. *Q.*—What is represented on this relief? *A.*—A bird.

FIG. 14. *Object.*—A crystal ball on a carved metal pedestal in a floor case. *Q.*—What does the pedestal represent? *A.*—Cliffs, with houses and trees.

IV. *Crouching.*

FIG. 15. *Object.*—Engraving after Canaletto in the lower row of a wall-case. *Q.*—Is the space in the center land or water? *A.*—Water.

FIG. 16. *Object.*—Terra-cotta statuette on lower shelf of case. *Q.*—What is this goddess resting her elbow on? *A.*—A smaller statuette bearing a drum-shaped object on its head.

FIG. 17. *Object.*—English posset cup in the base of a floor case. The observer was asked to read the label.

FIG. 18. *Object.*—A Greek vase on lower shelf of case. *Q.*—Describe the design on this vase. *A.*—A rough vine pattern.

FIG. 19. *Object.*—Cast of the Laocoon. The observer was asked to read the label.

FIG. 20. *Object.*—Drawing of the Propylea on an easel. The observer was asked to read the label.

FIG. 21. *Object.*—Drawing of the sculptures on the western pediment of the Parthenon, installed on the pedestal of the casts reproducing their remains. *Q.*—Describe the figure farthest to the right. *A.*—A youth lying down.

V. *Twisted.*

FIG. 22. *Object.*—A fragment of Arretine pottery lying near the end of a desk case. *Q.*—How many musical instruments can be seen in this group? *A.*—two: harp and pipes.

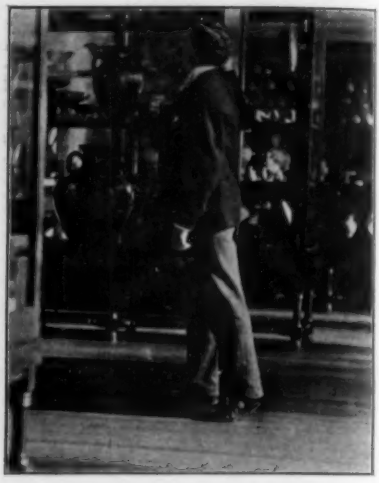
VI. *Looking up.*

FIG. 23. *Object.*—A landscape hung high. *Q.*—Is the sky clear or cloudy? *A.*—Overcast.

FIG. 24. *Object.*—A textile hanging over a wall case. *Q.*—Has the upper border the same pattern as the lower? *A.*—Yes; but reversed.

VII. *Stretching forward.*

FIG. 25. *Object.*—Statuette on a bracket back of a desk case. The observer was asked to read the label.



VIII. *Stretching up.*

FIG. 26. *Object.*—A vase on upper shelf of case. The observer was asked to read the label and notice the pattern.

FIG. 27. *Object.*—Chinese bronze mirrors in a wall case. *Q.*—Describe the pattern of one of the mirrors on the top row. *A.*—A central knob in a square with knobs about and other patterns.

FIG. 28. *Object.*—A vase on the back row of the upper shelf of a case. *Q.*—Is there a pattern on the neck? *A.*—Yes; bands of horizontal lines.

FIG. 29. *Object.*—A small ivory carving (netsuke) on the upper shelf of a floor case. *Q.*—How many wounds are there in this decapitated head? *A.*—Five.

IX. *Climbing up.*

FIG. 30. *Object.*—A cast of a head of Hera hung high on the wall. The observer was asked to read the label. *A.*—I can read the large letters, but not the small.

the floor and his hip joint about thirty-eight or thirty-nine inches. For the minutest inspection of a work of art, as for reading fine print, the eye should not be more than about twelve inches from it. The distance forward of a perpendicular from the feet, to which the eye may easily be carried by bending the body from the hips, is not over about fifteen inches. Of the objects commonly preserved in cases in our museums, but a small fraction, perhaps hardly more than a twentieth, are over twelve inches in diameter. Of objects of the nature of ornamented surfaces in frames or settings, or otherwise needing to be seen only on one side, but a smaller proportion are more than two or three inches from front to back.

From these figures approximate dimensions for cases which shall reduce the muscular effort of good seeing to a minimum may be deduced as follows: the lowest exhibition level for case objects should not be more than eighteen inches below the average eye, or forty-two inches from the ground instead of thirty inches or less, as often at present. This would be the indicated height for the bottom of upright cases and the front level of desk or flat cases. The use of the base compartment of cases for exhibition should be given up. The breadth of flat cases should not be greater than about eighteen inches, instead of twenty-eight inches or more as at present. Desk (inclined) cases may be somewhat wider. Beyond these limits the eye can not easily be brought within close seeing distance of the back of the case. The depth of flat or desk

cases from the glass to the bottom should not be greater than from two to four inches, instead of from six to twelve inches as at present. A depth from front to back of four inches would often also suffice for wall cases, instead of from sixteen to twenty-four inches as at present. Six inches might be regarded as their maximum supposing them used to receive only objects seen to full advantage from one side. The depth of upright floor cases from front to back should not exceed twelve inches. A smaller standard depth of eight inches would probably also be found useful. Upright floor cases or wall cases might be eighty-four inches high instead of one hundred or more as at present. It is true the bottom of an object twelve inches high installed at the top of such a case with three inches above to spare would be six inches above the average eye, and the top eighteen inches. But since, on the twelve-inch shelf assumed, all parts of the object would be within six inches of the glass, it would all be within practicable seeing distance, although only the lower part could be closely examined.

The stability of floor cases a foot or less in breadth and seven feet high would require to be secured by special means. If the legs were perpendicular, they would need to be fastened to the floor, otherwise they would need a wider bearing by extended feet; or a removable bar at the top of the case connecting it with another might be given a design in harmony with their framing and join the two into a stable pair.

One result of the use of shallower cases would be that there would be less waste space within them. At present the space within a floor case of the usual broad dimensions is only very partially used. The exhibit is generally arranged in a pyramidal form of which the lower levels are seen against the successive steps of an interior pedestal and only the top row is shown above it and can be seen on all sides. All the space above the lower rows of objects is empty. In the narrow case proposed there would be in general no pedestal, but shelves alone. There would be no empty space above any row of objects and every object would be visible from all sides. Since a larger number of cases could be placed in a given area, another result would be that a greater proportion of museum objects would be exposed to view on all sides. An economy of case-space would be coupled with a completer showing of case-contents.

Such changes would make a radical difference in the appearance of museum galleries. They would be fitted with a number of small cases, very shallow and standing but not reaching high, instead of a few large ones, broad, set low and rising higher. Wall cases would shrink to one quarter their present depth, upright floor cases to one third their present depth and to a less average height, and desk and flat cases to three quarters their width and one third their vertical depth. Delicate,

instead of heavy, construction would be the rule. The exhibits would be shown spaced and unobstructed instead of grouped into decorative pyramids or serried ranks. The small fraction of objects which are over twelve inches in diameter would be installed either in the open or each in its separate case.

Nevertheless, there would remain opportunity within the cases for the more or less advantageous showing of more or less meritorious objects. The upright cases on the floor and the wall would still have a *piano nobile,* or main level, in the space directly opposite the eye. Between a bottom at forty-two inches above the floor and a top at eighty-four inches, there would be forty-two inches of space which, if divided by two shelves giving three spaces about fourteen inches each, would offer three gradations of prominence: first, the middle at fifty-six to seventy inches, because seen without effort by the average eye at sixty inches; second, the lowest, because perfectly seen at forty-two to fifty-six inches by inclining the body a few inches; and third, the uppermost, from seventy to eighty-four inches, because seen simply by raising the glance, although inaccessible to the closest inspection. If divided by a central shelf at sixty-three inches, the upper space of twenty-one inches would be the *piano nobile,* because the lower and generally more important part of the object would be open to close inspection without fatigue. On the under shelf, only the upper and generally less important part of an object could be studied without bending.

In cases such as these museums would, for the first time, possess veritable show cases. Hitherto these indispensable protective devices have in reality been glazed storage chests valuable primarily for their capacity. Their wide shelving with double or triple or multiple rows of objects is a survival from the days when museums were thought of as magazines where things were kept in safety ready for inspection when needed. Such shelving has no real place in these days of serious attempts to deal with the problems of public show.

The present argument is not the first that has been offered in support of narrow cases; nor are they unknown in newer museum installations. Mr. Lewis Foreman Day wrote a few years ago:

> Museum cases are nearly always too big—and especially they are much too wide.
>
> One argument against deep cases is:
>
> that the things at the back of them (and in the center of square cases) are reduced to background. Another is, you can not get close enough to see things properly. . . . Think what a big vase you can put on a mantel-piece from nine to twelve inches wide, and you will realize how seldom it is necessary to have cases much wider than that. . . . Some of the cases at Munich are not more than nine inches deep, and it is astonishing the size of the objects they hold.[1]

[1] Lewis Foreman Day, F.S.A., "How to Make the Most of a Museum," *Journal of the Society of Arts,* January 10, 1908, p. 153 f.

The smaller shelf-widths which Mr. Day notes at Munich have come into occasional use also in other museums, American and foreign. In Boston the show-space tends also to be set higher.

The reduction in the cubic contents of museum cases here advocated, in harmony with Mr. Day's suggestion and newer practice, is the second radical improvement in these fixtures since public museums were instituted. The first is an improvement from the point of view of the museum; the second from the point of view of the visitor. The device known in Europe as the Reichenberger case (due to Dr. Gustav E. Pazaurek, Director at the time of the North Bohemian Museum of Industrial Art), and in America as the Boston case (independently invented with a different mechanism by Mr. W. W. MacLean of the Boston Museum), consists in opening a case by lifting its top with a windlass instead of unlocking its doors with a key. This was a proposal in the interest of the security of the contents from dust, damp and theft. The reduction of the size and particularly of the depth of cases is a proposal in the interest of the easy visibility of their contents. By making also this second advance in the construction of these necessary fixtures, the museum would be in a position to fulfill more perfectly both of its essential functions, first as guardian and then as expositor of the treasures committed to its charge.

The use of smaller cases has for a corollary a reduction in the number of objects shown simultaneously. It would be another step in the pathway which modern museums have already entered upon in dividing their contents into show and study series and in alternating objects between the two. The era of smaller and changing exhibits is also an era of better exhibition.

THE FUNCTION OF MILK IN THE SCHEME OF EVOLUTION

By HENRY DWIGHT CHAPIN, M.D.

NEW YORK

GOETHE once remarked that blood is a very peculiar juice. We can say the same of milk. Modern physiological researches have shown that certain glands and secretions of the body have much larger functions than have hitherto been assigned to them. We need only refer to the so-called "internal secretions" of various glands, formerly unrecognized, that are now known to exert a marvellous influence not only on physical life, but on mental development as well.

These facts have led us to give a closer scrutiny to the more familiar fluids of the body, of which milk is one of the best known, as it constitutes the universal food for the young of all mammalia. In serving this most important function it is recognized as a complete food, containing in itself all the elements required to support life. These include protein for growth and tissue repair, with mineral salts to aid in this function; carbohydrates and fats that produce heat and energy, and an abundance of water so necessary to carry on all the processes of life. From a nutritional standpoint, it is thus a perfect food, and all milks are alike in this respect. While each species of mammalian young is perfectly nourished by the milk of its own mother, the food elements are present in varying proportions in different species, this depending largely on the rapidity of growth of the offspring.

Another peculiarity common to all milks is that when collected from the mother they are always in fluid form, but as soon as taken into the stomach of the young they become more or less solid. This is due to a process of coagulation that takes place only in one of the ingredients—the protein—but which thus always alters the form of the ingested milk. While the carbohydrates and fats in their composition and reaction to the digestive secretions are a good deal alike in different milks, the proteins are essentially different. It is further to be noted that coagulation of the proteins of milk takes place in different degrees in the different species.

We are now led to two queries: (1) What is nature's object in presenting a fluid that always coagulates in the stomach that receives it, and (2) Why do the milks of different species coagulate in different ways? An answer will be found in studying the relation between the milk and the particular digestive tract that is destined to receive it. While a certain portion of the protein of all milks coagulates on coming in contact with rennin or rennin and acid, the manner and extent of

the coagulation will stand in a direct relation to the proper evolution of the digestive tract of the animal.

While there are many grades of coagulability in the milks of different animals, we may for practical purposes distinguish three of these grades and consider their significance. The protein may coagulate in a solid, gelatinous or flocculent manner. In the ruminant herbivorous animals, such as the cow, sheep or goat, the protein coagulates in solid, tough masses that can not readily escape from the stomach. In these animals, digestion is always largely gastric and the stomach forms seventy per cent. of the digestive tract. Later on, this stomach will be called upon largely to digest tough, stringy masses of hay and straw and the previous exercise on the tough curds of the milk develops it for this future work.

In the non-ruminant herbivora, such as the mare and ass, the protein coagulates in gelatinous masses that can easily leave the stomach. There is an object in thus passing the curds quickly along, as in this class of animals digestion is largely intestinal, and the intestines form about ninety per cent. of the digestive tract. Later on, grasses and grain must be largely digested in the intestinal portion of the tube, and hence the curd is here also especially adapted to develop a certain part of the intestinal tract for its future work.

In human milk the curd is thrown down in flocculent masses—a form intermediate between the solid and gelatinous types of curd previously noted. While digestion begins in the stomach, it is largely carried on and completed in the intestine, and the stomach forms only about twenty per cent. of the digestive tract. The curd is thus adapted to start the development and motility of the stomach, and finishes by instituting these functions in the bowel which is destined to play a predominant part in digestion. Here again the curd, as far as form is concerned, furnishes, to a certain extent, an analogue and precursor of the future food of the infant. The curd forms small, flocculent masses, and the future food must be separated later into small particles by chewing before digestion can take place to the best advantage.

We have thus seen that the milk of herbivorous animals, whose digestion is principally gastric, forms solid curds that can not easily leave the stomach; that the milk of herbivorous animals whose digestion is principally intestinal, forms gelatinous curds which easily leave the stomach and pass into the intestine; and that woman's milk, which is intended for a digestive system in which gastric digestion is more than that of the horse or ass, but not so great as the cow or goat, curds in flakes that stand between the other two types of curds. Hence it is a law that coagulation of the proteins of milk always takes place in such a way as to most readily adapt the digestive tract for its future work, as this function needs special preparation. It is thus seen that while a

certain amount of protein is present in the milk of all animals and is necessary for tissue building and growth, this protein must not only be coagulable, but must curd in a *certain specific way* in each species of animal for the proper evolution of their digestive tracts.

In studying the life history of animals it is observed that all commence life in an exceedingly simple form, and for a time their development proceeds along lines so nearly parallel that it is impossible to determine to what species the embryos belong. As development proceeds, a divergence of form and structure is noticeable. At birth this divergence is so great that there is no difficulty in distinguishing species, but the variation in the functions in nutrition at this time is not very great, especially in mammals.

The milks of different mammals at birth can be made interchangeable for many individuals of the young of various species, and, as far as nutritive value is concerned, they are often fairly satisfactory substitutes for each other. But at the end of the natural suckling period of many mammals, no such interchange of food would be possible. To realize what a divergence in the digestive functions has been taking place during the suckling period, imagine an infant, a kitten and a calf all being fed successfully on cow's milk. Here it is evident that at the very beginning of life the difference in their digestive processes is not very great; but wait a year until all three have passed the suckling period. The infant will be just beginning to eat soft food, the kitten will have developed so that it can eat flesh and bones, and the calf will be thriving on grass and hay. In one short year the divergence of their digestive tracts has been so great that the natural food of the calf is then wholly unsuited to the kitten or the infant, yet the chemist will find that the food of all three at this time contains the same basic nutritive elements as it did at birth. An important matter that seems to have been generally overlooked as far as milk is concerned is that this natural fluid is a food for a digestive tract that is rapidly changing its form and function, and the differences in the digestive properties of the milks of various species are for real and specific purposes.

As nutrition is the basis of all physical life, we see how important a function milk performs at the very beginning of existence in developing and preparing the digestive tract of each species so that it can digest and assimilate food that must nourish it in later life. We must thus emphasize the fact that milk through its protein has a *developmental* as well as a nutritive function to perform.

A directly practical point that can be deduced from this study is the importance of the mothers of every species suckling their own offspring, as they always do except in the highest species—man. The milks of different species are not readily interchangeable because the proteins have functions in helping to develop such radically different digestive

apparatuses. From a nutritional standpoint milks do not differ very markedly, but in developmental quality they are far apart. This forms a very good additional reason why every human mother should, if possible, nurse her own infant. The higher mortality following artificial feeding is thus not the only reason in favor of maternal nursing. In the former case by using the milk of another species—the cow—we put a hard curding milk into a stomach intended and adapted for a soft, flocculent curd. This is not only the cause of much indigestion, but such substitution fails to adequately carry out one of the functions that milk was intended to perform in the scheme of evolution,—namely, in each species to specially develop certain parts of the gastro-intestinal tract that must later perform most of the work of digestion.

PROFESSIONAL CONTRIBUTIONS TO INVALIDISM

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"The world's no blot for us,
Nor blank; it means intensely and means good.
To find its meaning is my meat and drink."

INVALIDISM: The habit of discussing our ills is apparently inveterate. The topic is as perennial as the weather and one which inspires eloquence even in the tongue-tied, and it is part of the shame of our intelligent (?) civilization that the frequency of invalidism is such that no babe waxes into short clothes without learning the chant of the invalid. There is no neighborhood, and indeed few homes, but count among their number sufferers from disease. To the eyes of advanced science much of this must be classed among the useless miseries of existence. Our own ignorant neglect of the laws of nature is largely responsible for the swelling chorus of suffering, misery and gnashing of teeth; and far too many of these unfortunates resent any imputation of personal responsibility, but spend much argumentative energy in settling to their satisfaction the entire blame upon their ancestors. It is not improbable that our descendants likewise will have many nice things to say of us.

The accuracies of modern medicine are filching from the quiver of disease dart after dart of potent damage and rapidly indeed are the causes of the grosser forms of invalidism being relegated to homes of crass ignorance or lives of senseless indulgence. Each decade, however, the standards of civilization are placed higher and the efforts requisite to keep in the van become increasingly strenuous. Meanwhile, the numbers able to join in the advancing ranks are increased. As man slips the bridle into the mouth of one after another of the forces of nature and by a finger's touch is able to turn midnight into noon, to set ten thousand wheels in motion, to contract the miles into inches and rend continents asunder; the mental strain increases in ratio to the decrease of physical work, and disuse of the body all too frequently permits misuse of the mind.

We will not question that a goodly proportion of the world's invalidism is an unavoidable by-product of the world's work, and that frail minds and bodies will ever strew the wayside of progress. Pitiful indeed is the necessity, yet a price each heroic soul will gladly give for the advancement of his race. In this discussion, however, we are particularly interested in the equally large class whose invalidism is use-

less and is but economic and spiritual waste. Our wider knowledge proves with pitiless conclusiveness that much of the suffering of the present time is the result of man's meddling with nature. The victories of science have made it clear that matter is but the plaything of thought, and the expert assures us that much of man's endless tale of woes, so eloquently described by thoughtless tongues is but a jangling discord of weakness and pain, produced by the careless or ignorant performer. In all too many homes the spirit of invalidism is a household goddess at whose shrine each member of the family does devotion. Even as in the days of our Lord, many a poor soul is held in bondage by this spirit of infirmity eighteen years, yea, twice eighteen years, waiting to be loosed by some Lord of the Miracle. Meanwhile, the daily routine, the household activities, the best time and strength of one or more helpers, the interest and devotion and earnings of the strong members of the family, must rise in incense from the altar of sacrifice. In our fair land alone, the productiveness of tens of thousands of homes is being dissipated through the tyranny of what by half knowledge is considered one of life's inevitables. When the touch of larger knowledge turns on the full light of truth, the irreligion of this self-torture of ignorance will be apparent, and all of the vanity of this form of invalidism fade away. I recognize how vast a field of romanticism and sentimentality will be devastated when we all understand and rightly value the various forms of invalidism and refuse to humor, aye to tolerate that parasitic mass of the self-pitying, self-centered, sympathy-craving, wilful, indulged, satisfied and unnecessary invalids. A glad day indeed will it be for the noble burden-bearers when disseminated knowledge rids home and community of the vitality-reducing oppression of what many to-day look upon with awe as sanctified and solemn suffering. For those inevitable invalids whom we shall always have with us, sympathy and charity and love and service will ever be their spontaneous mead. But for that invalidism which does not belong to this hopeless class; the invalidism of convenience, selfishness and ignorance, that passive, inert and vulgar mass which is to-day robbing pity, defrauding love and paralyzing charity; every word of knowledge, every ray of the white light of truth, every effort to repress, are God-sent messengers of redemption.

Who can count the cost of the world's invalidism? Some try to cheapen it by expressing it in so many millions per annum. This represents but the smallest expenditure. This weird by-path of life is strewn with some of the richest of man's gifts. Energy lies fainting, ambition is crippled, weak and dying, the purse of generosity is emptied, sympathy has wept her eyes blind, the heart of love has burst, even truth babbles and unselfishness has long since been crowded from the by-way by the glutton of self, who has robbed all his ministers of

their virtues, himself remaining virtueless. Close following with shambling foot-steps, eager to complete the toll of suffering, follows idleness, the poison-breeder, contaminating the very air of heaven, and how may the moral life survive in his baneful presence? The cost of useless suffering can never be told by the scales of the money-changer, but it is to be known by the wrecked lives, the deadened hearts and the defective characters it has produced.

The Professions.—To one man in a hundred is given the desire, the will or the ability to lay hold on the higher truths of life and to raise himself through special preparation and contemplation above the standard of general averages in special lines of knowledge. These men usually belong to one of the so-called professions. A profession is an occupation which properly involves a liberal education. Before entering into the more restricted walk of his specialized learning, he devotes years to the development of all his mental faculties in a comprehensive study of mathematics, science, language and the arts. No professional man is worthy the name who has not received such preparation. Rich endowments and great centers of learning are at his service, and for a pittance the door of the accumulated knowledge of the ages is opened to him. He is above all other students expected to master the underlying principles of all the branches of learning he assays. Reason and judgment, comparative ability, the critical sense and recognition of the truth under all guises should be inherent in the developed professional man. Whether lawyer, minister, physician or artist, his determining ambition should be to seek and find and proclaim the truth. Though this ideal is rarely attained in the individual, the influence of the professions in matters of opinion is more often justified than mistaken. The very livelihood of the majority of professional men grows out of the confidence of the public in their knowledge and wisdom, a confidence which must largely be justified by results if one is to be accounted successful. Based upon his preparation, his ability and the confidence of his fellowmen, he maintains an enviable leadership and sways a potent influence over the opinions of his neighbor, who trusts his lands and his fortune, his health and physical comfort, his happiness here and hereafter, yea, his very soul's life, in the hands of his professional adviser. Upon a class accepting such sacred trusts rests a relentless responsibility and every word and act is fraught with peculiar influence, while the customs and habits of the professional man are often models which his less learned brother blindly follows to his weal or woe. Does it not behoove these leaders of thought, action, habit and opinion to attain wisdom with their learning and not be content with minds cluttered with mere knowledge?

As our knowledge increases in accuracy, we find that few laws are more simple than those of keeping well, we realize that the maintenance

of health can be condensed into a few simple precepts which the child or the ignorant may understand. But the living of these simple laws demands daily exercise of will and sacrifice of personal ease, a turning away from tempting indulgences and an active expenditure of effort and consistent denial of desire. The average man rebels at the rigid exaction of these plain laws of health and all too often endeavors to outargue nature, to reverse her decrees. With the strength and subtilty of his intellect he endeavors to create for human flesh different laws than apply to all other animal kind. The practical ignorance of the educated of the simple laws governing physical well-being is appalling, while very few indeed are found who, with any sort of consistency, accept and live those mental and moral laws which stand for perfection of health. Thus it results that robustness is rather the exception than the rule in the lives and homes of professional men and women. Physical frailty has indeed been so common in the past in the families of those of the higher walks of life that the ignorant were prone to consider delicacy or physical inefficiency as indicating a certain mark of aristocracy, and many a poor man's girl, finding her model in the minister's flat-chested, lily-skinned daughter, has abandoned household duties to her slaving, admiring mother to ape her sickly model. The table of the successful professional man too often groans with the burden of rich palate-stimulating, toxin-producing foods, and he and his family over-fed and under-exercised, over-clothed and under-sweated, are the first to fall victims to the common infections, tuberculosis, early Bright's disease and paralysis, while from such homes are recruited large numbers of the useless nervous invalid. How often, in the presence of doctors of divinity and legal lights of a more than local reputation, do I wish to turn away from a polluted breath, the shameful evidence of self-indulgence or ignorance in high places. Daily the physician is called to those homes of supposed refinement and learning to allay suffering, to quiet tortured nerves, to stay disease's ravages, to witness the last breath, where untimely death has ended useful careers because in these homes of so-called wisdom and leadership the crudest ignorance of the simple, rational formulæ of physical life has been the blight and the devastator.

The failure of the classical education to practically prepare men to live wisely has all too often been demonstrated. Classical education knows nothing of simple sanitation, of food values, of the equation between food and waste, of the nerves and their enemies. It has failed to recognize the inalterable relation between the eaten bread and the sweating brow; it has failed to instruct its students in the use of their hands, and in many of life's most productive work-shops the classical student is but a drone, so awkward and helpless and useless are his muscles. Even in youth he has grown old, because he has not learned the art of playing.

But long as is the list of physical debility and suffering, it is fully equalled by the miserable list of the mind's tormentors, chief of which are fear, that child of half-knowledge, and its half-sister, worry. I have found in many a professional man's home, the curse of fear gripping and damaging the lives of its members, and soul suffering being instilled into its children. Fear is a great producer of useless nervous torture, and yet is daily used as an influence in thousands of our best homes. Fear of the dark fills the night with terrors to the fear-taught child; fear of minor injuries and the incidental damage of knocks, bruises and falls, makes tense unnumbered mothers' lives during their children's play hours. Fear erects a barrier between youth and wholesome physical pain and makes weaklings of children and potential invalids of adults. Fear of its parents robs many a child of that wholesome admonition and counsel which he would otherwise seek, and perchance be saved from habits which sap strength of body and soul. An unwholesome fear of God and the unseen has produced untold psychic damage in unnumbered homes where such a heathenish conception of religion has robbed their children of the peace and courage which come from a religion of faith and health.

Emanating from these self-same homes come many of the fulsome testimonies of the efficiency of the products of ignorance and quackery, and many religious weeklies have been dishonored by the mass of patent-medicine testimonials appearing therein, often over the signatures of cured members of the family. Letters without number from well-known ministers, lawyers, authors and actors have made possible the irreparable mass of damage to mind and body, growing out of a dependence upon proprietary remedies, carrying large percentages of alcohol, opium, coca, chloral, bromides and the heart-paralyzing coal-tar products, usually masquerading under fictitious and misleading names. Cancer, tuberculosis and diabetic cure companies have been able to conduct their nefarious traffic in human life through the faith and trust inspired by the noted professional names and beaming intelligent faces used as testimonials. Grave responsibilities have certainly been assumed with a carelessness or ignorance of the awful consequences, to the shame of many thousands of professional men. So much of the sickness in the homes of the educated is of a psychic or nervous type, influencing individuals in whom the central nervous system has been long over-stimulated and in whom the reaction of mind upon body and body upon mind have become increasingly sensitive, individuals in whom, as in the delicate chronometer, misadjustments are easy and whose ever-sensitiveness acts as a magnifying glass, exaggerating the apparent seriousness of all their suffering; individuals in whom attention and memory pains may be produced almost at will, pains which the family practitioner fails to analyze or understand, and which finally

increase to the sufferer's apparent undoing, yet capable of disappearing at any time as if by magic, under the potent influence of an absorbing miracle of health production. And here again we find many of our professional leaders turning away from the definite accuracies of the natural sciences and allying themselves with the cults and isms of mystic fame. I would not for a moment question the wisdom of being tricked into health if it can be obtained no other way. I am arraigning that gross ignorance in the educated, which makes possible this class of illness and allows leaders to multiply the growing harm which comes from unscientific, non-treatment of disease of mechanical and chemical origin, through the force of their harmful, misleading example. The above characteristics may be recounted more convincingly if we will consider some concrete examples of professional contributions to invalidism.

The standard novel of our boyhood reading painted a most pitiful picture of its average heroine from the standpoint of health—slender in waist, slight in figure, fair to faintness, languid, dainty and delicate, all too good for this world. Out of this conception of aristocratic feminity how many thousands of our women have half-starved themselves, living on pickles and vinegar and lacing their protesting waists until their internal organs must have been addled, have systematically protected themselves from God's out-of-doors and health giving sunshine and made themselves anemic, flat-chested, flabby-muscled, toxic, disease inviting, parasitic playthings! Even the more wholesome athletic heroine of the modern novel has not yet succeeded in driving from our midst these inane products of professional making. In far too many of the homes of influence to-day weakness is coddled and perpetuated because it still wears the halo of romantic beauty.

We look to the artist as the source of our ideals in adornment. I doubt not that the true artist would resent any association with the production of much that is styled beautiful in the decoration of our persons, and yet the artist is exceptional to-day who does not add the influence of his drawings to many of the health damaging and comfort destroying arrayments of the passing style. The physical damage to health as manifested in the annual thousands of unnecessary pneumonias in the fur-coated, silk-stockinged, bepumped apers of style, is not to be compared with the moral damage growing out of the insistent emphasis on the exaggeration of some of the female sexual characteristics, which are never lacking in the popular French creations. One season the bust is emphasized, another the hips, again the skirt is fairly stretched to reveal the thighs or so hobbled that silk stockings must be worn in self-defence. Unfortunately, even some of our prominent artists have repeatedly prostituted their art in propagating and popularizing styles in which our wives and daughters innocently bedeck

themselves in most suggestive attire, little realizing that the débutante's slouch of to-day is but a reproduction of the baudy house negligée of yesterday.

The contributions of the legal fraternity to the useless waste of suffering too often illustrate the lack of the judicial mind or the domination of the mercenary spirit. The competent, painstaking, conscientious physician is rarely called by the attorneys of the prosecution in personal injury suits. His opinion might be too near the truth for practical use; for medico-legal records are crowded with examples of invalidism based entirely upon the suggestive influence of a certain type of lawyer, a hypnotic invalidism which is genuine from the patient's standpoint. Through the representations of poor hysterics created by the influence of interested attorneys, corporations are filched many thousands annually by the combination of ignorance and cupidity. Accurate psycho-analysis reveals unerringly the ideational basis of many of the paralyses, spinal injuries and nervous prostrations following accidents, and producing uncompensated waste of time, loss of will and unconscious deception, yet all the outgrowth of the suggested idea. We know a type of lawyer too intelligent and honest to be *particeps criminis* in such fraud. I realize that the testimony of one or more physicians is usually necessary to the attorney in making his case in these trials, but I firmly believe that in the majority of instances the physicians engaged are unprepared to make those fine distinctions which are necessary in discriminating the functional from the organic disturbances of the central nervous system. The large number of spontaneous recoveries following the termination of these suits, favorable or otherwise, is opening the eyes of thoughtful physicians to this shrewd exploiting of medical ignorance by a sister profession.

It is with hesitation and a large degree of respect and awe that I invade the sanctity of the pastor's study. The art of the physician has long been devoted to healing the body. The minister has been the physician of the soul. With the great modern increase of psychic disorders, doctor and minister have each been appealed to for help. The intellect has been called the bridge spanning the chasm between the spiritual and the material worlds, and it is but natural that we should find the doctor of the soul at one approach eager to assist and support the weakened travelers of life. Meanwhile, the problem of attendance has emphasized the church's relations to man's physical life, while the providential idea of disease still holds a large proportion of church people in its fatalistic grip. Thus the minister ever finds himself intimately associated with human illness and suffering. Owing to the Bible's comprehensiveness, the devotee can extract from Holy Writ a most pessimistic religion of fear, and many a minister thus infected plants the disease of terror in the hearts of his hearers, and curdles

their faith with his fore-ordained damnations. With equal facility, another sees in the Good Book only faith, hope and love and but touches the mountain tops in his soaring optimism. So extreme may he be that he might easily obstruct the careful and painstaking work of our scientific health boards by his insistence on Divine protection, even in the midst of filth, flies and infection. And such contributions to invalidism are not overdrawn. Ofttimes the insistence of the religious teacher on the *minutiæ* of over-conscientious scrupulosity turns the eyes of the susceptible individual inward and produces that miserable disease of self-contemplation and paralyzes unselfish, productive effort by the obsession to be always right. One of the most difficult of the minister's problems is placing the proper emphasis upon the essentials and non-essentials in human conduct. The great art of harmonizing with one's environment is often unknown to the minister himself, and his efforts to inculcate help in this essential of leadership are therefore hopeless. The righteousness of deliberate damage to the body through the self-punishment of extreme asceticism has largely disappeared as an influence emanating from our modern church teachers. Yet the student of humanity still sees in the limitation of proper emphasis in church teaching of wholesome physical and mental living and the overemphasis by so many religious leaders of the thought that nothing matters but the soul, an emphasis which fails to recognize man's composite nature, an emphasis which if carried to a logical conclusion would result in a rapid reduction in human life, therefore in the production of souls. In this unwise emphasis may still be found remnants of old ascetic ideas. Religious susceptibility ofttimes results in the development of mere religiosity with no basis of character strength. The moral will is most naturally trained through the development of physical stability and mental determination. Some morbid teachers find in suffering and sorrow and misery the only possible road for the development of high moral character. While not for a moment discounting the importance of suffering and misfortune in the development of religious character, when properly received, it still remains true that the majority of unfortunates have failed to extract blessing from misery, while the healthy body and well-poised mind will ever remain the most fertile soil for soul growth. Many a poor mortal has lost his chance to lay hold on his foundation for soul health through very religious but ungodly advice that he work out his salvation in prayer and fasting, when his whole nature was dying for want of a religion productive of utilitarian activity. Sentiment is a delicate dessert, but in the feast of life the courses that sustain and make the brawn and sinew of mind, body and soul are found in life's rough and tumble, in which alone the preacher, teacher and doctor may find moral wills for religious invalids. To all leaders of the weak come frequent heart-moving

appeals from the slaves of sense. Often it is the cry of a soul which seems to be staggering under the hand of fate, one of that increasingly large number, a child all too often of one of our old families, who has felt the hot breath and burning desire for artificial drug comfort or stimulation. At the risk of my appeal being dismissed by many as that of a fault-finding abstainer, I feel impelled to express my peculiar burden of responsibility in regard to this pitiable class of weak and often defenceless fellow-men. At every corner the world flaunts her lurid temptations; at all too many social gatherings the mocker is bedecked in dazzling cut glass and iced into seductive coolness, one draft of which means defeat, for a taste opens the flood gates of hell in these sensitively organized weaker brothers. No tempted men and women fight more earnestly than many victims of drugs and alcohol. Little help can they receive through the wisest medical care, still doctor and friends and teacher unite in giving the trite advice to "cut it out." "Touch not, taste not, handle not" has been the sum of human wisdom in their behalf for multiplied centuries. The religious adviser shakes his head and assures the defective that the grace of God is the only power which can save him. He is pressed to attend prayer-meeting and church services, and there thoughtlessly kicked hellward with fermented communion wine. Many a poor soul has lost his fight at the "Lord's table." Usually of attractive social qualities, society welcomes him to her feasts when he is straight, then looks at him with obvious disdain when he tremblingly turns down his wine glass. At the annual medical or legal banquet, surely no power but the grace of God can save him in the midst of spiked punch, cock-tails, the cool, freely quaffed amber beer, the laughing dancing golden champagne, the personally conducted high-balls of the cloak room and the formal course wines of the supper, vying with each other as his soul's seducers. We are cataloguing professional contributions to one of the most soul-damning forms of invalidism known to unstable man. Faith in forms, customs, ceremonials, rights, alone is but husks. Faith, the reason of the heart, must be based on the truth of accurate knowledge, which is the reason of the mind.

I have reserved my own profession until the last in considering the damaging influences growing out of the defective example and teaching of mankind's logical leaders. Last, because from the very fact that they are by profession healers, their shortcomings are more reprehensible and far-reaching and damaging in their effects. It is a great misfortune that the difficult curriculum of modern medical colleges is so burdened with the complexities of disease, its causes, symptoms and treatment, that little or no room has been left to teach normal living. The doctor's medical rearing takes place in an atmosphere saturated with disease and the complexities of its treatment, and it is only in the latest years that any attention has been given to teaching him how disease can be pre-

vented, and little or no instruction is yet given along the lines of the simple, rational physical and thought life which counts so emphatically for health. A second and graver defect in the physician's education lies in the fact that many complete medical courses are planned and carried out with no reference made or even suggestion offered to the student of man's mental, physical and spiritual interdependence. The young physician must grope about through several foggy years before he accidentally learns the newer psychology or has this fundamental relationship knocked into his understanding by the plain logic of experience, and realizes that many invalid-producing misadjustments are due to other than physical causes. This defect in the average physician's education accounts for the long list of invalids suffering as a result of psychic or moral trauma, which he drugs in vain. The common medical insistence on materialism must give place to a broader conception of man's being. The story of medical mal-leadership of the past is a shameful one; based as it is, however, largely on ignorance and often upon honest ignorance, it must in a measure be excused. To-day many souls are giving their all, in rare nobility that the problems underlying human ills may be solved. Still medical leadership shows numbers of common and very damaging defects of influence. The average physician's slavery to drug medication is difficult for intelligent minds to understand. It is too closely associated with the methods of dishonest quackery to be comfortable under scrutiny. The majority of medical prescriptions call for compounds absolutely lacking in specific or even general influence upon disease processes, and yet how rare is the physician who after examining the patient, and realizing that drugs can be but a false help, frankly gives his patient truly helpful advice, advice properly influencing his personal habits, which will, if followed, produce real cure. Many physicians satisfy their patients' almost superstitious desire for medicine and their own knowledge that there is no drug to cure, by administering what is technically termed a placebo, a harmless inert substance which contents the sufferer until nature accomplishes that which the physician is unable to helpfully modify by pill or potion. How seldom the physician takes his patient into his confidence and explains the *modus operandi* of such treatment. So the fetish of drug dependence, strong in the physician, lays an even heavier hold on the laity. This would prove of but comparative damage if all medicine were innocent placebos, but in his armamentarium, the physician has medicaments of a potency irresistible for good, but likewise fatal for damage, drugs which for the time will stay the trembling hand and whip the faltering nerves into activity, which will still the small voice of discomfort, rob weariness of its weakness and lull pain and anguish into drowse and dreams. Weak and ignorant human nature clutches at these artificial comforts, little realizing or caring that too often the fire of

disorder has but temporarily been chocked with new fuel, to soon break out the fiercer. How few physicians frankly and firmly show their patients the common relation between drug taking and character weakness? How often do they make clear to impatient sufferers that the help given by drugs is but fleeting and that too often dodging the corners of discomfort is the first step toward the death of will? How rarely is the physician's influence strong and wholesome in inspiring the patient with his superiority to circumstances! How seldom does he quietly and hopefully explain the nature of the disorder and its rational, logical handling without habit-producing or will-wilting poison, and show him how he may by passing through a few hours of temporary discomfort learn that profound lesson of will and health which will be his future protection! The contributions of medical weaklings to the great aggregate of damage caused by unwise drugging, are mentioned with shame. As a profession, doctors, in addition to harmful drug use, fail in their higher usefulness through a willingness to nurse and coddle unnecessary suffering, and through many popular, though questionable arts of superficial sympathy, not only maintain but produce invalidism. So much of the waste of sickness of to-day grows out of self-indulgence that it is humiliating to see our men of medicine pampering the weaknesses underlying these human derelicts. It is truly a serious charge to make against one's own profession, that in the practise of its art, it is aiding and abetting the very invalidism which looks to it alone for cure. Could every doctor fill his patients with some measure of manly contempt for comfort, safety and ease, and inspire each of his ill ones with a larger and nobler conception of the blessing of transient suffering manfully faced, as compared with the misery of self-pity which comes when a human being surrenders all that stands for personal victory and self-mastery to a craven hour of ease, then would the days of much useless invalidism be numbered. Meanwhile, the stronger, wiser and truer of the medical profession will be found working shoulder to shoulder with all teachers of wisdom in that noble and stimulating task of supplying wills for the will-less.

I wish my subject permitted even a few paragraphs on the brighter and more inspiring aspect of sickness, that I might give a physician's testimony to some of the wholesome lessons of illness, of the growth of character in the midst of pain and infirmity and disability, how deformity is often associated with an inspiring sweetness of spirit and how joy and strength and happiness dwell in the shadows of death, so I might tell of the power of the hand fairly transparent in its weakness to clutch the heart of friends and helpers with a grip that steels the strong to greater strength and stays weakness in its wastefulness. It would indeed be joy to write thus. But I may drop but this hint of the silver lining of the cloud which has occupied our attention for the hour.

My final appeal is for the development of a class of guides, call them doctors, ministers or teachers, or what you will, so trained in the understanding of a man's physical, mental and moral needs as to know the individual in all his phases, so equipped with the ability which follows a complete mastery of his profession and so filled with that irresistible power which comes when one has joined understanding with truth, so imbued with sympathies alive to human nature and its changing needs and so supported by all true helpers of mankind that his word will stand as authority and his wisdom prevail in levelling the heaped up monuments of invalidism, which to-day are being built through the ignorance of professional leadership.

> "The world's no blot for us,
> Nor blank; it means intensely and means good.
> To find its meaning is my meat and drink."

IS SELECTION OR MUTATION THE MORE IMPORTANT AGENCY IN EVOLUTION?

By Professor WILLIAM E. CASTLE
BUSSEY INSTITUTION

THIRTY years ago the opinion prevailed among biologists that biological evolution, like geological, is a very gradual process in which agencies acting with uniformity over long periods of time gradually produce changes in existing species through natural selection. About the year 1900 a change of opinion set in, which may be described as a tendency to return to the older idea of the sudden and special creation of species. Not that the idea of evolution was to be abandoned, but the province of natural selection was now thought to be less extensive, its action being limited to deciding what species shall survive. As to the *origin* of species, this was supposed to occur suddenly as a result of undetermined agencies, but not to be either attended by natural selection or caused by it. This theory of the sudden and spontaneous origin of species unattended by natural selection is known as the mutation theory. Philosophically it has much in common with those geological theories which regard geological epochs as inaugurated by terrestrial catastrophes, and those astronomical theories which involve cosmic collisions and explosions in the origin of new heavenly bodies. Historically the mutation theory owes its present popularity chiefly to the work of the Dutch botanist, DeVries, and the Danish botanist, Johannsen, though many others have given it ardent and valuable support.

In clearing the ground for a theory that species are not produced by natural selection, DeVries and Johannsen have attempted first to show the inability of selection of any sort to produce specific changes. Selection, they maintain, can produce nothing new. It can only sort over and rearrange variations already present. The strongest existing evidence in favor of this view consists of the selection experiments of Johannsen with size variations in beans and the similar experiments of Jennings with paramecium. As a result of this and other similar work a useful classification of variations has been established, which are said to be either *phenotypic* or *genotypic*. The former are variations due to purely environmental causes, such as soil, temperature, humidity, food, etc. These are not inherited. They are apparent rather than real racial changes so far as evolution is concerned. In contrast to these phenotypic variations are those called genotypic, the causes of which lie in changes within the germinal substance. They are hereditary.

Environmental agencies, those which produce phenotypic variation, are very complex and oftentimes one agency counteracts another. The

resultant or combined action of several independent agencies is in biology as elsewhere, to produce variation of the frequency-of-error sort. This kind of variation which mathematicians express in the so-called "normal" curve or "curve-of-error" biologists call "continuous" because it consists of graded quantitative variations which shade insensibly into each other.

The best known cases of genotypic or heritable variations are those which are of considerable magnitude and in which a single genetic factor is involved, because it is easier to follow the history of these from generation to generation. It was therefore a natural but none the less unfortunate conclusion on the part of the mutationists that *all* continuous or graded variations are phenotypic (not inherited), while all genetic (heriditary) variations are discontinuous. Manifestly this is a pure assumption, for logically it is to be expected that several independent genetic agencies acting simultaneously will produce continuous variation, whereas a single and isolated environmental change may produce discontinuous variation. In fact, Mendelian studies have already shown that several independent genetic factors may frequently produce a series of graded or continuous variations. But if these supposed factors are themselves constant, it is theoretically possible to alter the racial type by selection only to a limited extent. For the action of selection will be restricted to the production of the possible combinations or permutations of the genetic factors present. But if, on the other hand, genetic factors are themselves variable in a quantitative way, continuous or graded variation of the organism might result from the action of one genetic factor alone, and all the more from the joint action of several such varying factors. In that case selection would be capable of producing uninterrupted change in racial characters, because it could not only isolate particular combinations of genetic factors, but it could also isolate higher or lower quantitative stages of each factor. Its action would therefore be limited only by the limits of variability of each genetic factor.

Mendelians have generally assumed that the genetic factors with which they are concerned are quantitatively invariable. This assumption was made, probably at first, for logical simplicity and then from habit, so that now it has come to be one of the fundamental tenets of many Mendelians. But so far as evidence is concerned, either observational or experimental, it has small basis. At first Mendelians assumed that all *characters* which Mendelize are invariable, that crossing does not affect a Mendelian character, that the recessive character when it is recovered again following a cross is the same as ever and so Bateson proposed in 1902 to discard old ideas of racial purity and institute a new test of racial purity which should consist simply in determining the presence or absence of particular Mendelian characters. But more careful study of Mendelian characters soon showed that they were not

invariable. Extracted recessives were frequently observed to be different from the recessives which entered into a cross two generations previously. So the idea of character constancy had to be abandoned, but in its place has come the idea of *factor* constancy. It is now held by many that the changes observed in Mendelian characters as a result of crossing are due to other independent genetic factors introduced by the cross, the main factors themselves being unaffected. If this is so, then by eliminating these *other* or modifying factors it should be possible to secure an invariable or pure race. Such pure races it was believed by Johannsen that he had secured in the case of self-fertilized beans studied by him, and Jennings at one time entertained similar views concerning asexually produced races of paramecium. But it should be pointed out that in neither case was a Mendelian character under observation, so that these investigations have no direct bearing on the question whether Mendelian factors are or are not quantitatively variable.

In my studies of Mendelian heredity I early encountered characters obviously variable and I have been engaged for several years in trying to discover the causes of this variability. Crossing was evidently such a cause, contrary to the earlier idea of character constancy and gametic purity. This having been settled, attention was next directed to the theory of factor constancy. To test this, crossing must obviously be avoided, since by this means the experimenter might unwittingly introduce modifying factors. Modifying factors must either be eliminated or rendered constant before one could hope to test the variability or invariability of a single factor. The surest means to this end would be inbreeding attended by selection. Under this procedure modifying factors should be gradually eliminated or rendered constant (homozygous) and a condition of racial stability secured equal to the stability of the single genetic factor concerned in producing the character under observation.

If the genetic factor in question were entirely stable and invariable, racial change under selection should gradually slow up and finally stop altogether, as one modifying factor after another was eliminated or rendered constant (homozygous), and this is what DeVries and Johannsen have assumed actually occurs.

The best material which I have been able to discover on which to test this matter consisted of piebald black-and-white or gray-and-white hooded rats. This color pattern of white and pigmented areas behaves in heredity as a simple Mendelian recessive character. (See Fig. 1). It is the alternative (or allelomorph) of the entirely pigmented or "self" condition of wild rats. In crosses with such wild rats the hooded character is recovered as an extracted recessive character in one fourth of the second generation offspring. In a total of 1,483 such offspring, 493, or 24.9 per cent., have been hooded. Individuals possessing the recovered

character frequently have either more or less extensively pigmented bodies than their hooded grandparent and are not entirely uniform among themselves. In fact a family of hooded rats is never entirely uniform, no matter how closely selected and inbred. They produce only hooded young when mated with each other, but some possess rela-

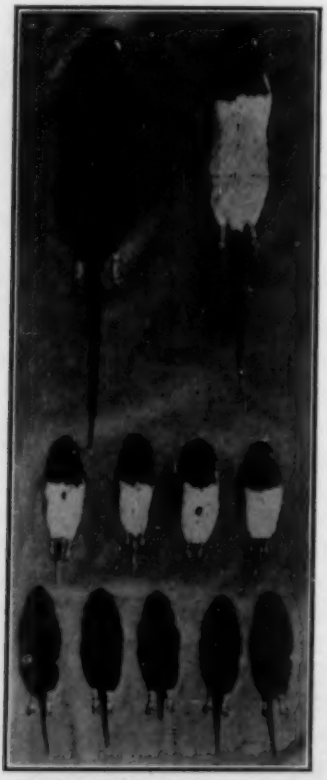


FIG. 1. SKINS OF A LITTER OF NINE RATS AND OF THEIR PARENTS. The inheritance is alternative (Mendelian) but each alternative condition shows slight quantitative variations.

tively more white than others. In order to learn whether these quantitative differences in the hooded character are hereditary, selection experiments were begun in 1907 upon a small colony of hooded rats derived originally from less than a dozen individuals. The blackest rats (*i. e.*, those with most extensive black areas) were chosen to start a plus selection series, and the whitest rats (*i. e.*, those with least extensive black areas) were chosen to start a minus selection series. From the offspring of the plus selected parents the blackest were again chosen, and from the offspring of the minus selected parents the whitest were chosen, and this process was repeated in each generation. Sixteen successive selections have thus far been made in the plus series,

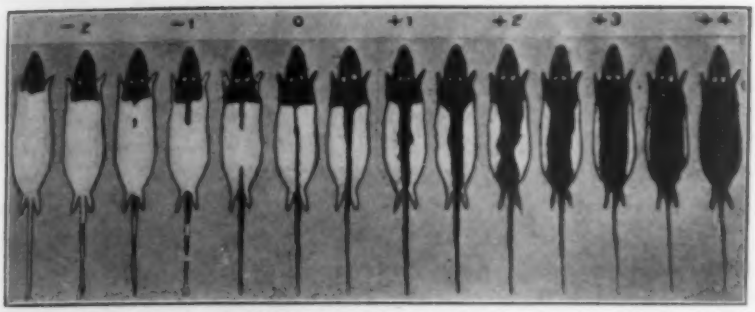


FIG. 2. A SCALE OF ARBITRARY GRADES USED IN CLASSIFYING THE FLUCTUATING VARIATIONS OF HOODED RATS.

and seventeen in the minus series. The plus series has become steadily darker, the minus series lighter, until two very distinct races have resulted. In order to classify the young more accurately and to express in more definite terms the quantitative changes which have taken place in the hooded character, each rat has been graded in terms of an arbitrary scale of increased (plus) or decreased (minus) pigmentation as compared with the original modal condition of the race (zero condition). See Fig. 2.

TABLE I

RESULTS OF THE PLUS SELECTION OF HOODED RATS CONTINUED THROUGH SIXTEEN SUCCESSIVE GENERATIONS

Generation	Mean Grade of Parents	Mean Grade of Offspring	Lowest Grade of Offspring	Highest Grade of Offspring	Standard Deviation of Offspring	Number of Offspring
1	2.51	2.05	+1.00	+3.00	.54	150
2	2.52	1.92	−1.00	+3.75	.73	471
3	2.73	2.51	+ .75	+4.00	.53	341
4	3.09	2.73	+ .75	+3.75	.47	444
5	3.33	2.90	+ .75	+4.25	.50	610
6	3.52	3.11	+1.50	+4.50	.49	861
7	3.56	3.20	+1.50	+4.75	.55	1,077
8	3.75	3.48	+1.75	+4.50	.44	1,408
9	3.78	3.54	+1.75	+4.50	.35	1,322
10	3.88	3.73	+2.25	+5.00	.36	776
11	3.98	3.78	+2.75	+5.00	.29	697
12	4.10	3.92	+2.25	+5.25	.31	682
13	4.13	3.94	+2.75	+5.25	.34	529
14	4.14	4.01	+2.75	+5.50	.34	1,359
15	4.38	4.07	+2.50	+5.50	.29	3,690
16	4.45	4.13	+3.25	+5.87	.29	1,690
						16,107

The first plus selected parents were of mean grade + 2.51. They produced 150 young of somewhat lower average grade than their parents, viz., + 2.05 (see Table I.). A second selection gave a similar result, but with young of slightly lower mean grade, viz., + 1.92. With each subsequent selection it was possible to raise the standard of the selected parents, and in each case the grade of the offspring has in-

creased correspondingly. As a result of the sixteenth selection, 1,690 young have been obtained *every one of which is darker* than *any* hooded rat born in the series previous to the second selection. Accordingly the character of the entire race has changed under selection. This change has come about gradually. Generation by generation, as the mean grade of the parents has advanced, that of the offspring has advanced in like measure, but always lagging behind the grade of the parents. With advance in the *mean* grade of the offspring has gone advance in both the upper and the lower limits of their variation. The amount of variability of each generation of offspring as measured by its standard deviation has decreased to about three fifths of its original extent, but has not changed materially in the last eight or ten generations, and there is no prospect of its declining further. The rate of racial change has also not become less. Reversed selection returns the race toward its previous condition at about the same rate as the departure has taken place.

It seems clear from these observations that the hooded character, though itself a simple Mendelian unit in heredity, is subject constantly to slight quantitative variations which are themselves to some extent hereditary. These quantitative variations are grouped like continuous variations round a mean the position of which may be altered gradually but permanently by repeated selection.

A series of seventeen minus selections yielded results similar to those obtained in the plus selection series, but with a movement of the mean and of the upper and lower limits of variation in the opposite direction (see Table II.). In this case a race has been secured whiter in nearly every individual than any rats contained within the original race. The whitest rats have only a few pigmented spots left on the body, chiefly located on either side of the head close about the eyes, ears and nose. In the plus selected series the blackest rat obtained (grade $+5.87$) was black all over except for the presence of a few white hairs on the chest between the front legs. No fancier would have thought of including it among "hooded" rats, or even among "Irish" (white-bellied) rats; fanciers would undoubtedly have classed it among "self" rats. There is apparently no limit to the quantitative change which can be produced in the hooded pattern by selection, short of its complete extinction in the all white or all black condition toward which our minus and plus selections respectively are steadily tending. Yet there can be no doubt that only a single genetic factor is here involved. A tentatively adopted hypothesis that modifying factors were concerned in it has been definitely disproved. Any finite number of such modifiers would have been greatly reduced or eliminated altogether by seventeen successive selections, yet no slowing up is observable in the rate of change of the racial character under selection either plus or minus. The changes effected by selection show per-

manency under crosses with wild rats. They change no more nor less than an unselected hooded race does. A first cross of the selected races seemed to show a partial undoing of the changes produced by selection, but a second cross made on a still larger scale, involving over 1,000 second generation individuals, showed no further change of this sort, but instead a return to about what the selected race would have been had no crossing at all occurred.

TABLE II

RESULTS OF THE MINUS SELECTION OF HOODED RATS CONTINUED THROUGH SEVENTEEN SUCCESSIVE GENERATIONS

Generation	Mean Grade of Parents	Mean Grade of Offspring	Lowest Grade of Offspring	Highest Grade of Offspring	Standard Deviation of Offspring	Number of Offspring
1	−1.46	−1.00	+ .25	−2.00	.51	55
2	−1.41	−1.07	+ .50	−2.00	.49	132
3	−1.56	−1.18	0	−2.00	.48	195
4	−1.69	−1.28	+ .50	−2.25	.46	329
5	−1.73	−1.41	0	−2.50	.50	701
6	−1.86	−1.56	0	−2.50	.44	1,252
7	−2.01	−1.73	0	−2.75	.35	1,680
8	−2.05	−1.80	0	−2.75	.28	1,726
9	−2.11	−1.92	− .50	−2.75	.28	1,591
10	−2.18	−2.01	−1.00	−3.25	.24	1,451
11	−2.30	−2.15	−1.00	−3.50	.35	984
12	−2.44	−2.23	−1.00	−3.50	.37	1,037
13	−2.48	−2.39	−1.75	−3.50	.34	1,006
14	−2.64	−2.48	−1.00	−3.50	.30	717
15	−2.65	−2.54	−1.75	−3.50	.29	1,438
16	−2.79	−2.63	−1.00	−4.00	.27	1,980
17	−2.86	−2.70	−1.75	−4.25	.28	868
						17,142

The conclusion seems unavoidable that the single genetic factor involved in this case has undergone quantitative change under the influence of selection. If so, two foundation postulates of the mutation theory are false, viz., (1) that continuous or graded variations are not concerned in evolution and (2) that selection of such variations, no matter how long continued, can effect no permanent or progressive racial changes. Selection, as an agency in evolution, must then be restored to the important place which it held in Darwin's estimation, an agency capable of producing continuous and progressive racial changes. Evolution biological as well as geological may still legitimately be regarded as a gradual and continuous process free from sudden catastrophes.

The idea of fixity among living things seems to be one which the human mind is loath to give up and which has to be constantly combated in the advancement of biology. For centuries it was the fixity of species which dominated biological thought. Darwin had to dispel this idea before he could get a hearing for evolution. When the Mendelian theory of unit-characters came in, the idea of fixity, unchangeableness, attached itself to the unit-characters. Driven from this hold,

it now seizes on the single factors on which Mendelian characters depend. Simultaneously it attaches itself to the conjectural mechanism which underlies Mendelian heredity, the chromosomes. We hear much now about their fixity and constancy of structure down to the minutest visible granules, and the argument is even offered that inherited characters must be constant because the chromosomes are. It is probable that, if chromosomes could be seen as readily as inherited characters, their structure would be found to be no more constant than that of the inherited characters supposed to depend upon them. As a matter of fact students of the chromosomes do observe great variability in the size, shape, density and even in the number of the chromosomes, but those who wish to believe in the fixity of such structures find convenient explanations for these observed variations in the action of killing reagents, stains, etc., just as we genetists invoke supplementary and modifying factors when we desire to defend the idea of fixity in our hypothetical genetic factors. The biologist may well take warning from the history of his science against assuming fixity of either structure or function in living things. The search for fixity will doubtless continue to shift, as it has done heretofore, from higher to lower stages, and will not find what it is looking for until it reaches the inorganic materials which, though they are the building stones of life, are not life itself.

Certain questions will occur to the critical reader. Is the evidence for the foregoing conclusions adequate? Are the conclusions based on a sufficient number of observations, and have these observations been carefully and accurately made? I believe that all these questions may be answered in the affirmative. Seventeen generations of offspring in the minus selection series and sixteen generations in the plus selection series have been studied. The generations of plus or minus selected offspring respectively average over a thousand individuals each, the total for the entire series being 33,249 rats, all descended from less than a dozen original recessive animals whose progeny have been continuously selected in a particular direction without intercrossing between the two series since the experiment began. Of course control crosses of various sorts have been made, as with wild rats, and between the two series, but the derivatives of such crosses have been wholly excluded from the selection series here described. Certainly no such mass of material dealing with the variation in a single Mendelian character has previously been available for study. The grading has been done with the same standard set of grades constantly at hand for comparison, and it has been done mostly by one person. The series of observations has been made possible through financial assistance received from the Carnegie Institution of Washington. Dr. John C. Phillips has rendered valuable assistance in the arduous work of raising and studying the large numbers of animals involved in these experiments.

THE PROGRESS OF SCIENCE

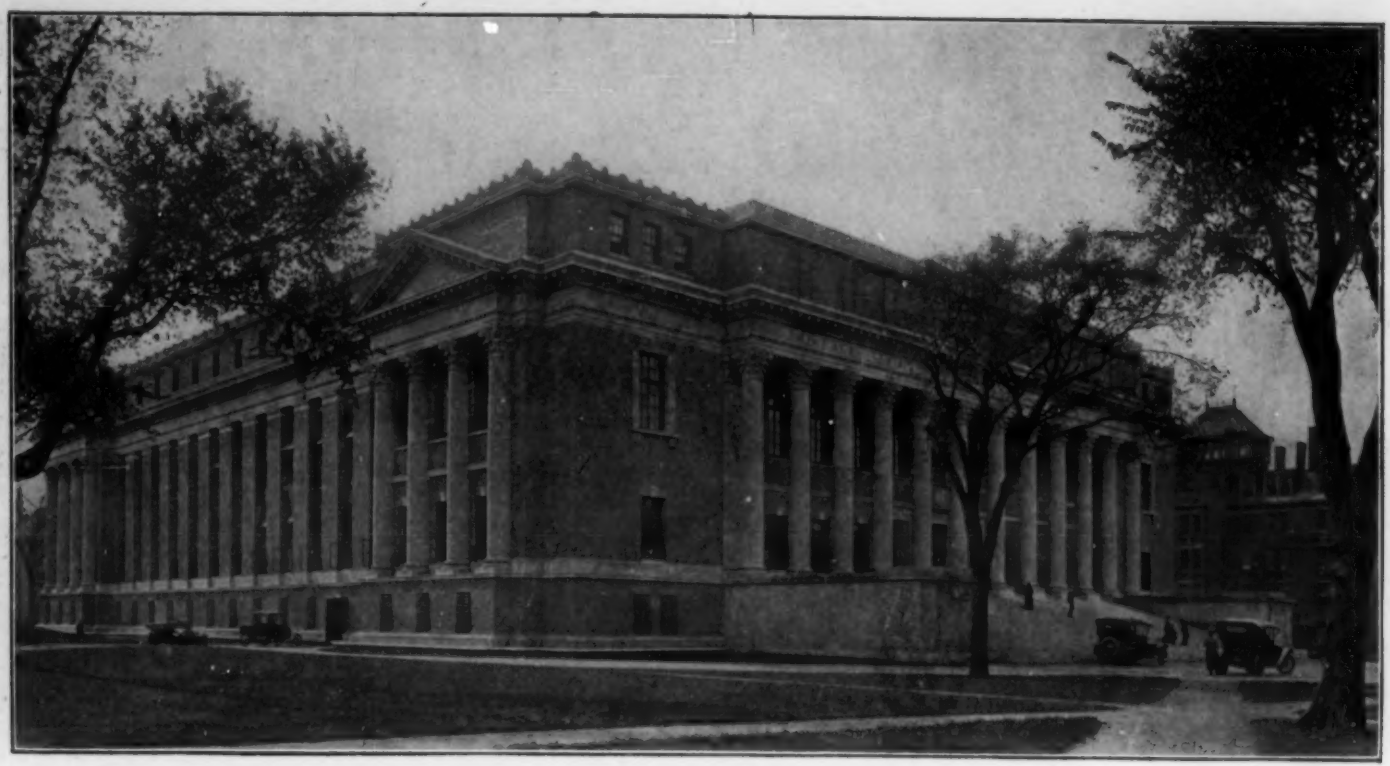
THE CONVOCATION-WEEK MEETINGS OF SCIENTIFIC SOCIETIES

THE scientific men of the country will hold their annual meetings this year at widely separated places and with some conflict. The American Association for the Advancement of Science is responsible for the arrangement of the convocation-week meetings, having fourteen years ago transferred its own meeting from mid-summer to the Christmas holidays. At the same time it obtained from many universities and colleges an extension of the Christmas holidays or grants for leave of absence, so that the week in which New Year's day falls should be free for these meetings. The American Association arranges also for the meetings of affiliated scientific societies which may wish to meet in conjunction with it. It is not expected that all these societies will meet every year with the Association, for there are obvious advantages in the isolation of a single society or a small group concerned with related subjects, as well as in a large congress covering all the sciences and numbering its attendance by the thousands.

In order to meet the complicated conditions as well as may be, the American Association has planned a program, according to which once in four years there shall be a great convocation-week meeting representing all the natural and exact sciences, and perhaps, ultimately, also engineering, education, economics, history, philology, literature and art. Such a demonstration of the intellectual forces of the country should be a stimulus to those who join in it and an exhibition that would impress the whole country. It is proposed to hold these meetings once in four years and in succession in New York, Chicago and Washington. The first will take place in New York at the end of the year 1916, and thereafter they will be held in the four-year periods at which the national presidential elections occur. In the intervening two-year periods the meetings will also be in large scientific centers, and it is expected that most of the national scientific societies will take part. The first of these meetings was held in Philadelphia, and the next will probably be held in Boston at the end of the year 1918. In the intervening years the American Association will meet at places more remote from the large centers of scientific population, or in cities or at universities where the accommodations are more limited. The first of these meetings was in Atlanta at the end of the year 1913, and the meeting this year is at the Ohio State University, Columbus. In 1917, it will probably be in Toronto, Nashville or Pittsburgh.

At these meetings the attendance of scientific men is in the neighborhood of a thousand; at the larger meetings it may be two or three thousand, and at the four-year periods, from five to ten thousand. The vast extent of the country makes it difficult for the scientific men of the west to visit the east, and conversely, during the Christmas holidays, and summer meetings may be held in the west once in four years, the first having been held this summer in connection with the Panama-Pacific exhibition, and on the occasion of the organization of a Pacific Division of the Association.

Although the meeting of the American Association opening at Columbus, on December 27, is not one of the larger convocation-week meetings, it promises to be of more than usual interest to those who are able to be pres-



THE HARRY ELKINS WIDENER MEMORIAL BUILDING.

ent, as was the case with the meeting held at the Ohio State University some fifteen years ago. The address of the retiring president, Dr. Charles W. Eliot, who, called from a chair of chemistry to the presidency of Harvard University, has become by common consent our leader in education, is on "The Fruits, Prospects and Lessons of Recent Biological Science." An introductory address will be made by the incoming president, Dr. W. W. Campbell, the distinguished director of the Lick Observatory. Among the vice-presidential addresses before the eleven sections of the association may be noted important subjects, treated by Professor White, of Vassar College, in mathematics; Professor Zeleny, of Yale University, in physics; Professor Lillie, of the University of Chicago, in zoology; Professor Pearce, of the University of Pennsylvania, in pathology, Professor Hanus, of Harvard University, in education, and Dr. Bailey, formerly director of the Cornell Agricultural College, in agriculture.

Eighteen national societies, including the American Society of Naturalists, and the societies devoted to mathematics, physics, zoology, entomology and botany meet at Columbus in affiliation with the American Association. The chemists do not hold a winter meeting this year. The physiologists and pharmacologists meet in Boston; the anatomists in New Haven; the psychologists in Chicago; the philosophers in Philadelphia; the geologists, paleontologists, geographers, anthropologists, sociologists and economists in Washington.

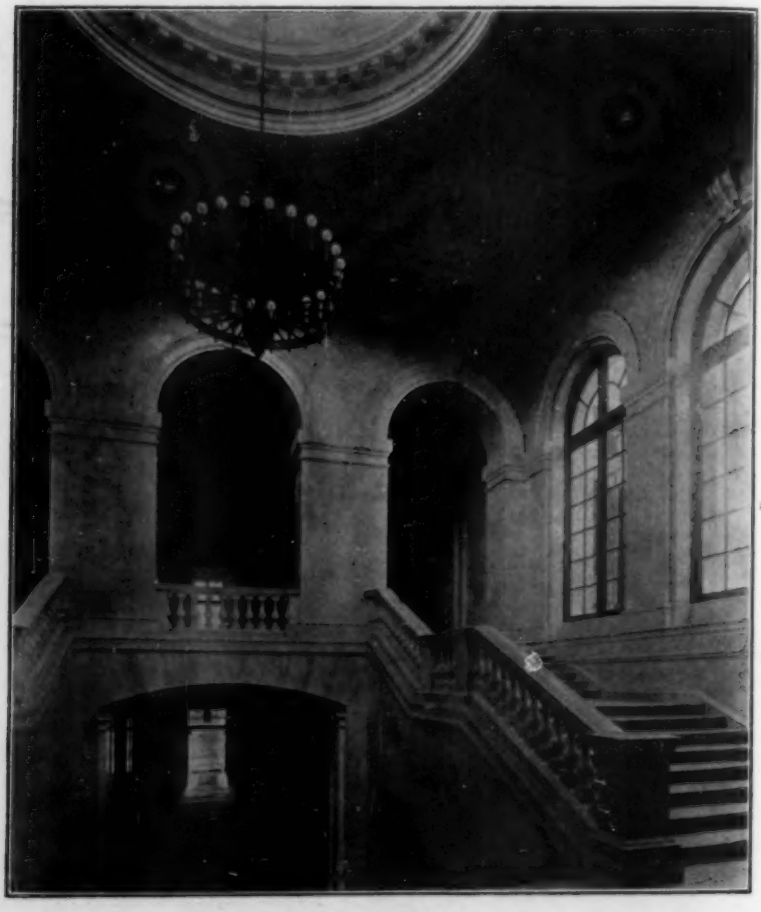
The serious conflict of the year is with the Second Pan-American Scientific Congress meeting in Washington from December 27 to January 8. It was originally planned that this congress should meet in the autumn, but the date was changed and the preliminary arrangements were made without consultation with American scientific men. The officers of the congress, selected presumably by the department of state, are Mr. Phillips, the third assistant secretary of state, chairman of the executive committee; Mr. Scott, secretary of the Carnegie Endowment for International Peace, vice-chairman; Mr. John Barrett, secretary-general; and Mr. Glen L. Swiggett, assistant secretary-general. The department of state is probably as ignorant of the scientific condition of the country as the navy department, whose secretary when asked why he had ignored the National Academy, by law the scientific adviser of the government, and the American Association, the great democratic body of scientific men, in selecting the societies to elect members of the Naval Advisory Board, appeared never to have heard of either association. A program in nine sections has been arranged for a "scientific" congress, which ignores mathematics, physics, pure chemistry, geology, zoology, botany and psychology.

However, attempts have been made to rectify the earlier errors. Dr. Welch, president of the National Academy of Sciences, has been made honorary vice-chairman, and Surgeon General Gorgas, Dr. Holmes and Dr. Woodward have been added to the executive committee. The conflict in time does not extend to the second week of the Pan-American Congress, and it is probable that after the adjournment of the Columbus meeting a special meeting of the American Association will be held at Washington. Under existing conditions, it is extremely desirable that friendly relations and cooperation in science should be maintained among the American Republics.

THE WIDENER MEMORIAL LIBRARY OF HARVARD UNIVERSITY

THE corner-stone of the Harry Elkins Widener Memorial Library was laid on June 16, 1913, and two years later, on Commencement Day, June 24, 1915, the dedication of the then completed building took place. The architect was Mr. Horace Trumbauer, of Philadelphia,

and the general contractors were George F. Payne and Company, also of Philadelphia. The building, of brick and limestone, is in the Georgian style of architecture, and is practically of fireproof construction throughout. It is in the form of a hollow square, measuring about 200 x 250 feet on the outside. The building faces the north; a broad flight of steps, surmounted by a colonnade of twelve massive columns, leads to the main entrance. The entrance hall, fifty feet long and thirty-six wide, is lined with Botticino marble, with a double row of columns of veined statuary marble. To the right a corridor leads to the director's office and to the room for the library council. Back of this is the treasure room, devoted to the safe keeping of the library's rarest books and specially fitted with locked metal bookcases. In front and immediately to the right of the entrance is another large room that is eventually to be used for a select library of standard books that shall be accessible to all comers without formality. A corridor to the left leads to the librarian's office and to the rooms of the order and catalogue departments. In the latter is



ENTRANCE HALL.

READING ROOM.

WIDENER MEMORIAL ROOM.

contained the official catalogue of the library.

From the entrance hall stairs lead directly to the Widener memorial rooms; one is a reception hall finished in white Alabama marble, the other, finished in carved English oak, contains Harry Widener's library. At the landing in front of the Widener rooms the main stairway divides and leads on each side to the second floor. Here, occupying the whole front of the building, is the main reading room. This room, together with the periodical room adjoining it at the west end, has seats for 292 readers. At the east end, opening both from the hall and from the reading room, is the delivery room where the public card catalogue is placed.

On the third floor, which rests on top of the stacks, are thirty-four rooms used for some of the special libraries, for seminary rooms, and for studies. There is also a large room for the library's collection of maps. Among the special libraries accommodated here are the Child memorial, the Lowell memorial, the French, German and Sanskrit, the mathematical, and those of the Business School and the Bureau of Municipal Research. The collection of theatrical material recently presented to the library by Robert Gould Shaw, of Boston, is placed in two rooms on this floor.

On the ground floor, on the west side, is a special reading room for elementary work in connection with the courses in history and economics. This has a separate entrance and provides seats for 166 readers. The rest of this floor is used for various working purposes. Below this is a basement, which at present serves mainly to accommodate the machinery necessary to run the building, but will eventually provide storage space for many thousand volumes.

The book-stacks, which run round three sides of the building, comprise ten floors, but for the present the two lower floors are not to be used and are therefore not equipped with shelving. The capacity of the stacks as at present shelved is about 1,433,000 volumes; with closer shelving and the addition of the two lower floors the total capacity should be about 2,200,000 volumes. Besides this, there is room for several hundred thousand volumes in other parts of the building. A distinguishing characteristic of the stacks is the series of reading-stalls along the sides of the principal floors. There are three hundred of these stalls. In addition to this provision for the comfort of students, there are over sixty small rooms that can be used as private studies for professors or visiting scholars.

These facts are taken from a brochure, prepared by Mr. A. C. Potter, assistant librarian, which gives an interesting history of the library and an account of its collections. In 1638, Harvard College received three hundred and seventy books—mostly theological—bequeathed to it by John Harvard. In the course of a hundred and fifty years the library increased to 13,000 volumes. Since then it has grown in a geometrical ratio, doubling about each twenty years, until now the number of volumes is 675,000.

SCIENTIFIC ITEMS

We record with regret the deaths of Orville Adelbert Derby, chief of the geological survey of Brazil; of Carl Axel Robert Lundin, maker of many of the largest telescopes in the world; of Raphael Meldola, professor of organic chemistry in the University of London, and of Dr. Henry Charlton Bastian, the distinguished London neurologist, the author also of books on the origin of life.

Sir J. J. Thomson, Cavendish professor of physics at Cambridge, has been elected president of the Royal Society, in succession to Sir William Crookes.